Stormwater Memo

1.0 Introduction. The proposal is to construct a 2 mW and 5 mW (AC) ground mount solar energy generating systems on a semi-active farm. This document presents existing and proposed construction as well as hydrologic conditions pre- and post-development.

2.0 Existing Conditions. As shown on sheet C-1.0 Existing Conditions Plan, much of the overall parcel is a vacant and the proposed project is in an area that is under-utilized. The remainder of the parcel is forested areas and multiple ledge outcroppings.

3.0 Proposed Construction. On the attached sheet C-3.0 layout and Materials Plan the solar system is laid out generally along the northerly portions of the three (3) parcels. Tree clearing and vegetation removal is planned. The following is some information about the system characteristics.

Solar System Characteristics	2 mW	5 mW
Site Area:	187.5± acres (84.1-2, 84.1-5.2, and 84.-1-6)	
Number of 385 w Modules:	9,412	20,670
Number of Central Inverters:	1	2
Height of Fence:	7-foot	
Proposed Impervious area:	<1,000 sf (concrete pads)	
Proposed gravel roads:	2.6 acres±	
Fenced area:	13.16 acres	28.39 acres

The system is located on the vacant land with buffers (setbacks) maintained around the solar fields. The racking is low profile (9± feet high), does not generate noise, and has minimal impact on municipal services.

4.0 Stormwater. There are only negligible (<1,000 square feet) new impervious surfaces (concrete equipment pads) associated with this project. The stormwater runoff from this site discharges in four (4) distinct locations in a hydrological study area of 130.2 acres.

4.1 Pre-Development Watersheds

The current conditions include strictly sheet flow from forested areas and cropland. Crops are primarily alfalfa, hay and similar grains. There are no known culverts or ditches. There are four (4) points of analysis. These are shown on the Pre-Development Watershed Plan.

4.2 Post-Development Watersheds

There are four (4) points of analysis. These are shown on the Post-Development Watershed Plan. Watershed areas and boundaries changed slightly due to the gravel roads, roadside swales (ditches), and road culverts.

Point of Analysis 1 (POA-1). This watershed area (24.6 acres) is to the far east of the overall hydrological area and on the east side of a north-side ridgeline. This watershed discharges to the southeasterly portion of the hydrological area in a small ravine. Runoff will continue to travel the same route in the post-development condition as it does now. There is less runoff in each of the modeled storms in the post-development condition.

Point of Analysis 2 (POA-2). This watershed area includes the majority (84.2 acres) of the overall hydrological area and the point of analysis is along the town/village line to the west edge of the project area. This tributary area decreased by 1.0 acres from the pre-development condition. Runoff will continue to travel a similar route as the pre-development condition. However, there are

swales and culverts associated with the new gravel road that are included in the Hydrocad analysis. There is less runoff in each of the modeled storms in the post-development condition.

Point of Analysis 3 (POA-3). This watershed area (12.5 acres) is to the far north central portion of the overall hydrological area. This tributary area increased by 4.0 acres due to the location of the road. This watershed discharges to northerly and off-site. Runoff will continue to travel the same route in the post-development condition as it does now, however it will travel in roadside swale and through a culvert. There is less runoff in each of the modeled storms in the post-development condition.

Point of Analysis 4 (POA-4). This watershed area (9.0 acres) is to the far south of the overall hydrological area and discharges via a roadside swale on the east side of Route 30. This tributary area decreased by 3.0 acres due to the location of the road. There is a proposed improvement to the CMP culvert under the existing dirt driveway. This location will be maintained as the permanent driveway for the solar project. Runoff will continue to travel the same route in the post-development condition as it does now, although it is captured in a proposed roadside swale.

4.3 Hydrocad Analysis

In order to determine the peak rate of discharge for existing and proposed conditions, runoff hydrographs using Hydrocad, were generated for the 2-, 10- and 100-year, 24-hour storm events using the Soil Conservation Service (SCS) Technical Release 20 Method NOAA/NRCC distribution.

As shown in Table 1 below, overall post-development peak stormwater runoff rates for the project are less than the pre-development peak stormwater runoff rates for the entire site. The four (4) design points are associated with the current topography of the site. Aside from the road grading and the 2-foot high landscape berm just south of the 2 mW solar system, there is no other grading. The overall watershed (hydrological study area) of 130.2 acres.

The hydrologic soil groups are primarily D type soils with some B type soils. See Hydrologic Soil Group figure attached. The cover types are "*Meadow-continuous grass, protected from grazing and generally mowed for hay*", *"Woods-Good", and "Row crops, straight row, Good"* for the existing conditions and "*Meadow-continuous grass, protected from grazing and generally mowed for hay*" and *"Woods-Good"* for the post-development condition. Additionally, the new gravel road (*"Gravel Road"*) is included in the post-development analysis.

The comparison of peak rates of runoff are shown in Table 1 below.

Table 1 Peak Stormwater Runoff Rates (in cfs)

Design Point	**Area** (acres)		**2-Year Storm** (2.51 inches)			**10-Year Storm** (3.64 inches)			**100-Year Storm** (6.21 inches)		
	Pre	Post	Pre	Post	Δ	Pre	Post	Δ	Pre	Post	Δ
POA-1	24.6	24.6	14.3	11.8	(2.5)	34.3	30.6	(3.7)	89.1	83.8	(5.3)
POA-2	83.1	84.2	30.6	27.5	(3.1)	61.6	56.0	(5.6)	139.7	139.3	(0.4)
POA-3	16.5	12.5	13.3	8.7	(4.6)	26.0	17.9	(8.1)	57.2	45.9	(11.3)
POA-4	6.0	9.0	9.4	5.6	(3.8)	17.2	10.3	(6.9)	35.8	21.5	(14.3)
	130.2	130.3*									

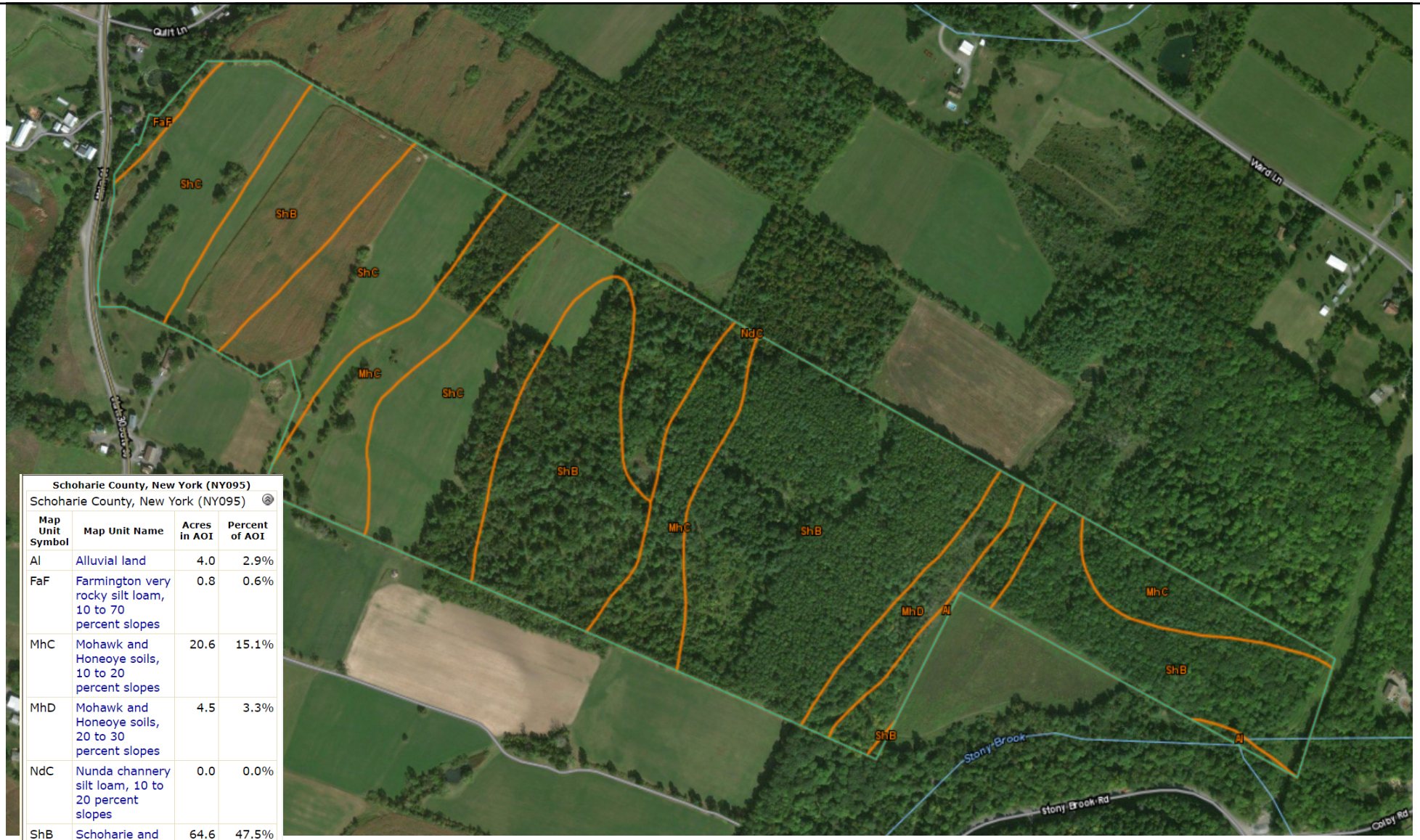
*Rounding error

Solar Projects
117 Bliss Road
Schoharie, NY

PV Engineers, P.C.

David M. Albrecht, P.E.
Principal Civil Engineer

FIGURES



Schoharie County, New York (NY095)

Schoharie County, New York (NY095)

Map Unit Symbol	Map Unit Name	Acres in AOI	Percent of AOI
Al	Alluvial land	4.0	2.9%
FaF	Farmington very rocky silt loam, 10 to 70 percent slopes	0.8	0.6%
MhC	Mohawk and Honeoye soils, 10 to 20 percent slopes	20.6	15.1%
MhD	Mohawk and Honeoye soils, 20 to 30 percent slopes	4.5	3.3%
NdC	Nunda channery silt loam, 10 to 20 percent slopes	0.0	0.0%
ShB	Schoharie and Hudson silt loams, 2 to 6 percent slopes	64.6	47.5%
ShC	Schoharie and	41.5	30.5%

Date: 06/28/2018

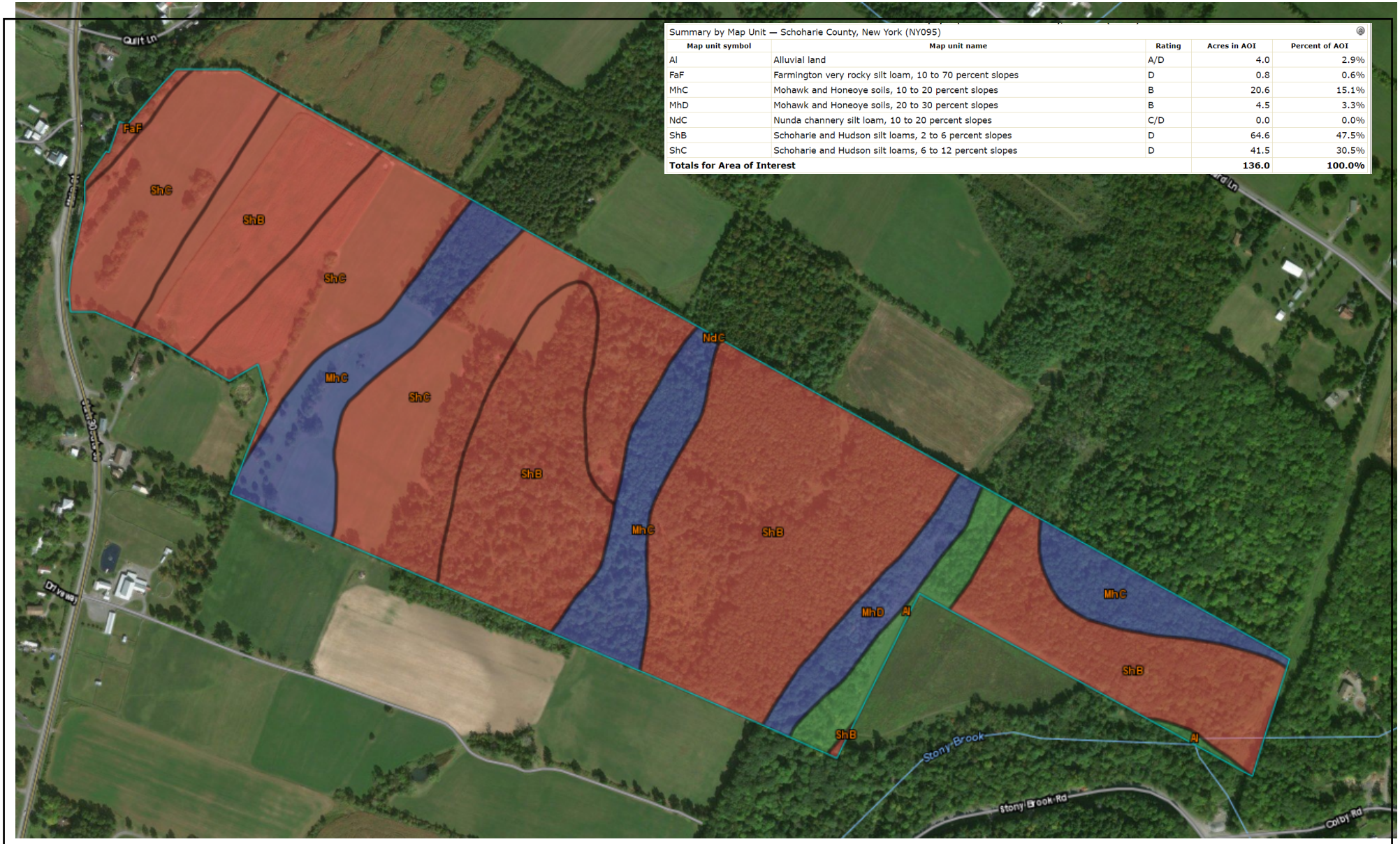
FIGURE 1

NRCS Soils Survey-Soil Types
117 Bliss Road (NYS 30)
Schoharie, New York

Data Source: www.websoilssurvey.com

BORREGO SOLAR

Borrego Solar
Systems, Inc.
55 Technology Drive
Suite #102
Lowell, MA 01851



Summary by Map Unit — Schoharie County, New York (NY095)

Map unit symbol	Map unit name	Rating	Acres in AOI	Percent of AOI
Al	Alluvial land	A/D	4.0	2.9%
FaF	Farmington very rocky silt loam, 10 to 70 percent slopes	D	0.8	0.6%
MhC	Mohawk and Honeoye soils, 10 to 20 percent slopes	B	20.6	15.1%
MhD	Mohawk and Honeoye soils, 20 to 30 percent slopes	B	4.5	3.3%
NdC	Nunda channery silt loam, 10 to 20 percent slopes	C/D	0.0	0.0%
ShB	Schoharie and Hudson silt loams, 2 to 6 percent slopes	D	64.6	47.5%
ShC	Schoharie and Hudson silt loams, 6 to 12 percent slopes	D	41.5	30.5%
Totals for Area of Interest			**136.0**	**100.0%**

Date: 06/28/2018

FIGURE 2

NRCS Soils Survey-Hydrologic Types
117 Bliss Road (NYS 30)
Schoharie, New York

Data Source: www.websoilssurvey.com

BORREGO SOLAR

Borrego Solar Systems, Inc.
55 Technology Drive
Suite #102
Lowell, MA 01851

APPENDIX A

Hydrocad Calculations

PRE-DEVELOPMENT WATERSHED PLAN

SCALE: 1" = 200'

0 200' 400'

PV Engineers P.C.
55 TECHNOLOGY DRIVE, SUITE 102
LOWELL, MA 01851
PHONE: (888) 845-4273
FAX: (888) 843-6778

NOT FOR CONSTRUCTION

SITE USE PLANS
117 BLISS RD
SCHOHARIE, NY 12157

PROJECT NUMBER: 908-0999

REV	DATE	DRAWN	CHECKED	RELEASE LEVEL
1	7/3/18	CS	DMA	SUBMISSION TO PLANNING BOARD
2	3/29/19	CS	DMA	SUBMISSION TO PLANNING BOARD
3	6/5/19	CS	DMA	SUBMISSION TO PLANNING BOARD
4	9/5/19	CS	DMA	TOWN BOARD RESUBMISSION

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" x 36"

W-1.0
PRE-DEVELOPMENT WATERSHED PLAN

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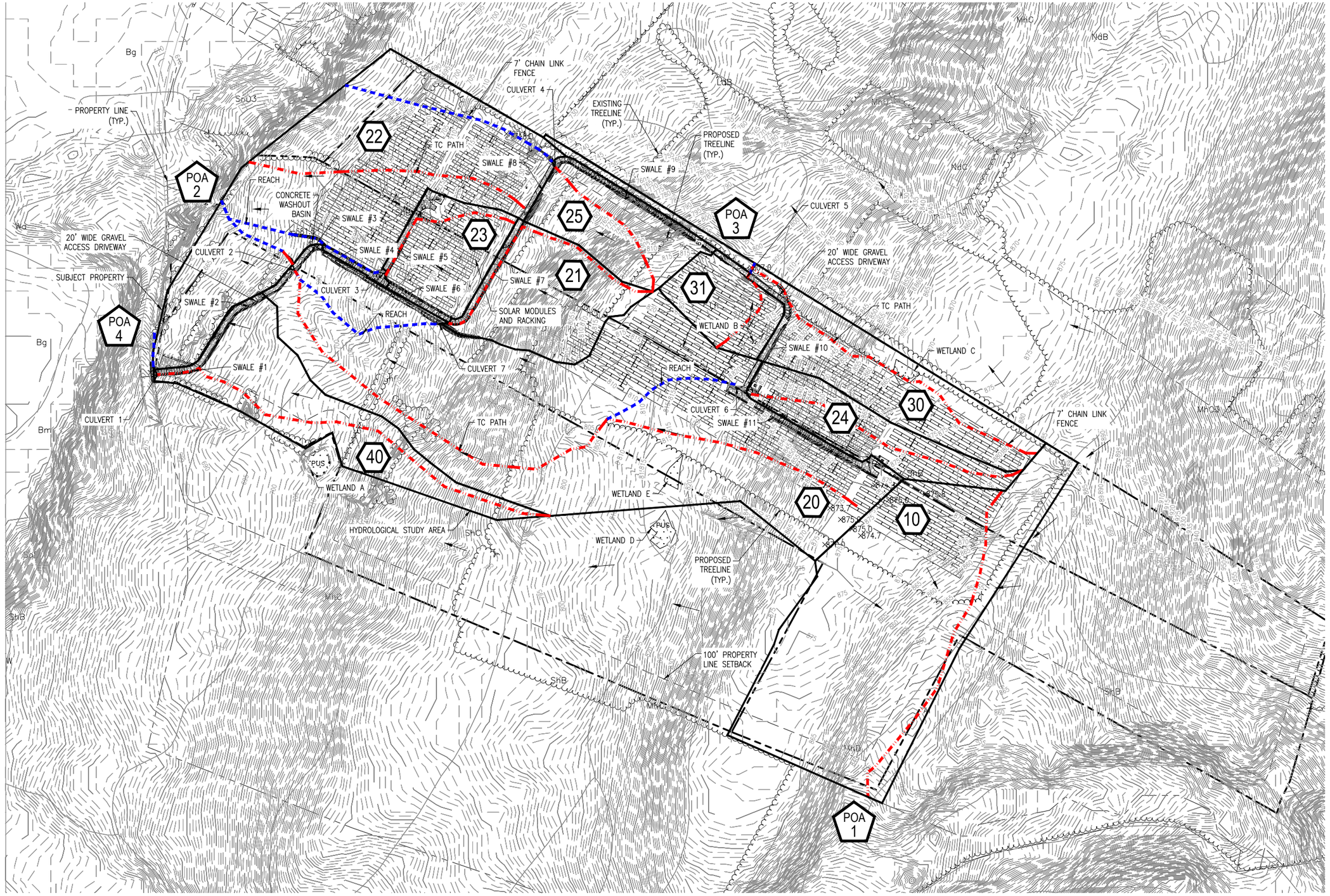

POST-DEVELOPMENT WATERSHED PLAN

SCALE: 1" = 200'

0 200' 400'

PV Engineers P.C.
55 TECHNOLOGY DRIVE, SUITE 102
LOWELL, MA 01851
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4	9/5/19	CS	DMA	TOWN BOARD RESUBMISSION

SCALES STATED ON DRAWINGS ARE VALID ONLY WHEN PLOTTED ARCH D 24" X 36"

W-2.0
POST-DEVELOPMENT WATERSHED PLAN

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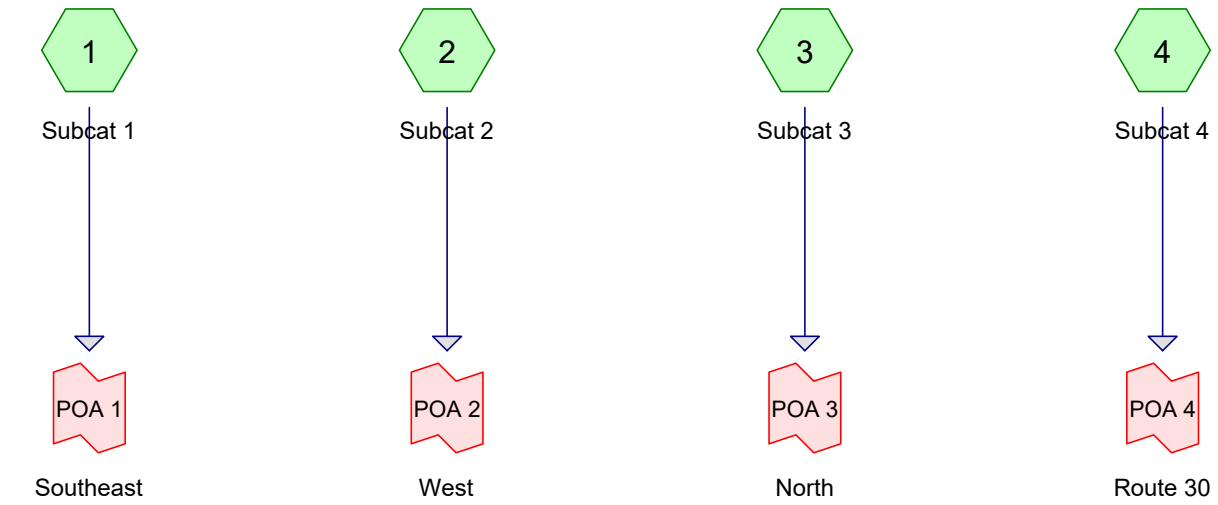
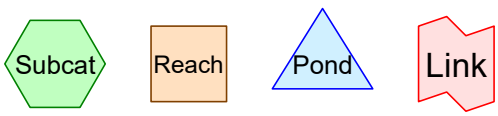




Routing Diagram for 117 Bliss Rd NY_Hydrocad Pre_090419_D
Prepared by Borrego Solar Systems, Inc., Printed 9/6/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
0.1	82	Dirt roads, HSG B (2, 3)
0.1	89	Dirt roads, HSG D (3, 4)
14.2	78	Row crops, straight row, Good, HSG B (1, 2, 4)
52.8	89	Row crops, straight row, Good, HSG D (1, 2, 3, 4)
12.0	55	Woods, Good, HSG B (1, 2, 3)
51.0	77	Woods, Good, HSG D (1, 2, 3, 4)
130.2	**80**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.0	HSG A	
26.3	HSG B	1, 2, 3, 4
0.0	HSG C	
104.0	HSG D	1, 2, 3, 4
0.0	Other	
130.2		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.0	0.1	0.0	0.1	0.0	0.2	Dirt roads	2, 3, 4
0.0	14.2	0.0	52.8	0.0	67.0	Row crops, straight row, Good	1, 2, 3, 4
0.0	12.0	0.0	51.0	0.0	63.0	Woods, Good	1, 2, 3, 4
0.0	**26.3**	**0.0**	**104.0**	**0.0**	**130.2**	**TOTAL AREA**	

Summary for Subcatchment 1: Subcat 1

Runoff = 14.3 cfs @ 12.16 hrs, Volume= 1.3 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.4	78	Row crops, straight row, Good, HSG B
1.7	89	Row crops, straight row, Good, HSG D
4.8	55	Woods, Good, HSG B
17.7	77	Woods, Good, HSG D
24.6	74	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 30.6 cfs @ 12.99 hrs, Volume= 6.6 af, Depth= 0.95"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.0	82	Dirt roads, HSG B
12.1	78	Row crops, straight row, Good, HSG B
38.0	89	Row crops, straight row, Good, HSG D
5.6	55	Woods, Good, HSG B
27.4	77	Woods, Good, HSG D
83.1	81	Weighted Average
83.1		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
26.5	1,723	0.0470	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	1,816	0.0725	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
85.2	3,589	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 13.3 cfs @ 12.28 hrs, Volume= 1.4 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.1	82	Dirt roads, HSG B
0.1	89	Dirt roads, HSG D
9.6	89	Row crops, straight row, Good, HSG D
1.6	55	Woods, Good, HSG B
5.2	77	Woods, Good, HSG D
16.5	82	Weighted Average
16.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0020	0.0		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
5.7	421	0.0190	1.2		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	661	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.2	220	0.0345	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.1	1,352	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 9.4 cfs @ 12.05 hrs, Volume= 0.6 af, Depth= 1.12"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
1.7	78	Row crops, straight row, Good, HSG B
3.5	89	Row crops, straight row, Good, HSG D
0.7	77	Woods, Good, HSG D
6.0	84	Weighted Average
6.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0800	0.2		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
8.6	1,195	0.0660	2.3		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.6	1,245	Total			

Summary for Link POA 1: Southeast

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 14.3 cfs @ 12.16 hrs, Volume= 1.3 af
Primary = 14.3 cfs @ 12.16 hrs, Volume= 1.3 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: West

Inflow Area = 83.1 ac, 0.00% Impervious, Inflow Depth = 0.95" for 2-Year event
Inflow = 30.6 cfs @ 12.99 hrs, Volume= 6.6 af
Primary = 30.6 cfs @ 12.99 hrs, Volume= 6.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: North

Inflow Area = 16.5 ac, 0.00% Impervious, Inflow Depth = 1.01" for 2-Year event
Inflow = 13.3 cfs @ 12.28 hrs, Volume= 1.4 af
Primary = 13.3 cfs @ 12.28 hrs, Volume= 1.4 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 4: Route 30

Inflow Area = 6.0 ac, 0.00% Impervious, Inflow Depth = 1.12" for 2-Year event
Inflow = 9.4 cfs @ 12.05 hrs, Volume= 0.6 af
Primary = 9.4 cfs @ 12.05 hrs, Volume= 0.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1: Subcat 1

Runoff = 34.3 cfs @ 12.15 hrs, Volume= 2.7 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.4	78	Row crops, straight row, Good, HSG B
1.7	89	Row crops, straight row, Good, HSG D
4.8	55	Woods, Good, HSG B
17.7	77	Woods, Good, HSG D
24.6	74	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 61.6 cfs @ 12.96 hrs, Volume= 12.6 af, Depth= 1.82"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.0	82	Dirt roads, HSG B
12.1	78	Row crops, straight row, Good, HSG B
38.0	89	Row crops, straight row, Good, HSG D
5.6	55	Woods, Good, HSG B
27.4	77	Woods, Good, HSG D
83.1	81	Weighted Average
83.1		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
26.5	1,723	0.0470	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	1,816	0.0725	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
85.2	3,589	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 26.0 cfs @ 12.27 hrs, Volume= 2.6 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.1	82	Dirt roads, HSG B
0.1	89	Dirt roads, HSG D
9.6	89	Row crops, straight row, Good, HSG D
1.6	55	Woods, Good, HSG B
5.2	77	Woods, Good, HSG D
16.5	82	Weighted Average
16.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0020	0.0		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
5.7	421	0.0190	1.2		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	661	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.2	220	0.0345	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.1	1,352	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 17.2 cfs @ 12.04 hrs, Volume= 1.0 af, Depth= 2.06"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
1.7	78	Row crops, straight row, Good, HSG B
3.5	89	Row crops, straight row, Good, HSG D
0.7	77	Woods, Good, HSG D
6.0	84	Weighted Average
6.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0800	0.2		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
8.6	1,195	0.0660	2.3		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.6	1,245	Total			

Summary for Link POA 1: Southeast

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 1.34" for 10-Year event
Inflow = 34.3 cfs @ 12.15 hrs, Volume= 2.7 af
Primary = 34.3 cfs @ 12.15 hrs, Volume= 2.7 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: West

Inflow Area = 83.1 ac, 0.00% Impervious, Inflow Depth = 1.82" for 10-Year event
Inflow = 61.6 cfs @ 12.96 hrs, Volume= 12.6 af
Primary = 61.6 cfs @ 12.96 hrs, Volume= 12.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: North

Inflow Area = 16.5 ac, 0.00% Impervious, Inflow Depth = 1.90" for 10-Year event
Inflow = 26.0 cfs @ 12.27 hrs, Volume= 2.6 af
Primary = 26.0 cfs @ 12.27 hrs, Volume= 2.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 4: Route 30

Inflow Area = 6.0 ac, 0.00% Impervious, Inflow Depth = 2.06" for 10-Year event
Inflow = 17.2 cfs @ 12.04 hrs, Volume= 1.0 af
Primary = 17.2 cfs @ 12.04 hrs, Volume= 1.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 1: Subcat 1

Runoff = 89.1 cfs @ 12.14 hrs, Volume= 6.9 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.4	78	Row crops, straight row, Good, HSG B
1.7	89	Row crops, straight row, Good, HSG D
4.8	55	Woods, Good, HSG B
17.7	77	Woods, Good, HSG D
24.6	74	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 2: Subcat 2

Runoff = 139.7 cfs @ 12.94 hrs, Volume= 28.2 af, Depth= 4.08"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.0	82	Dirt roads, HSG B
12.1	78	Row crops, straight row, Good, HSG B
38.0	89	Row crops, straight row, Good, HSG D
5.6	55	Woods, Good, HSG B
27.4	77	Woods, Good, HSG D
83.1	81	Weighted Average
83.1		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
26.5	1,723	0.0470	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
12.5	1,816	0.0725	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
85.2	3,589	Total			

Summary for Subcatchment 3: Subcat 3

Runoff = 57.2 cfs @ 12.26 hrs, Volume= 5.8 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.1	82	Dirt roads, HSG B
0.1	89	Dirt roads, HSG D
9.6	89	Row crops, straight row, Good, HSG D
1.6	55	Woods, Good, HSG B
5.2	77	Woods, Good, HSG D
16.5	82	Weighted Average
16.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0020	0.0		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
5.7	421	0.0190	1.2		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
6.6	661	0.1100	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
2.2	220	0.0345	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
32.1	1,352	Total			

Summary for Subcatchment 4: Subcat 4

Runoff = 35.8 cfs @ 12.04 hrs, Volume= 2.2 af, Depth= 4.39"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
1.7	78	Row crops, straight row, Good, HSG B
3.5	89	Row crops, straight row, Good, HSG D
0.7	77	Woods, Good, HSG D
6.0	84	Weighted Average
6.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.0	50	0.0800	0.2		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
8.6	1,195	0.0660	2.3		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
12.6	1,245	Total			

Summary for Link POA 1: Southeast

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 3.36" for 100-Year event
Inflow = 89.1 cfs @ 12.14 hrs, Volume= 6.9 af
Primary = 89.1 cfs @ 12.14 hrs, Volume= 6.9 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: West

Inflow Area = 83.1 ac, 0.00% Impervious, Inflow Depth = 4.08" for 100-Year event
Inflow = 139.7 cfs @ 12.94 hrs, Volume= 28.2 af
Primary = 139.7 cfs @ 12.94 hrs, Volume= 28.2 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: North

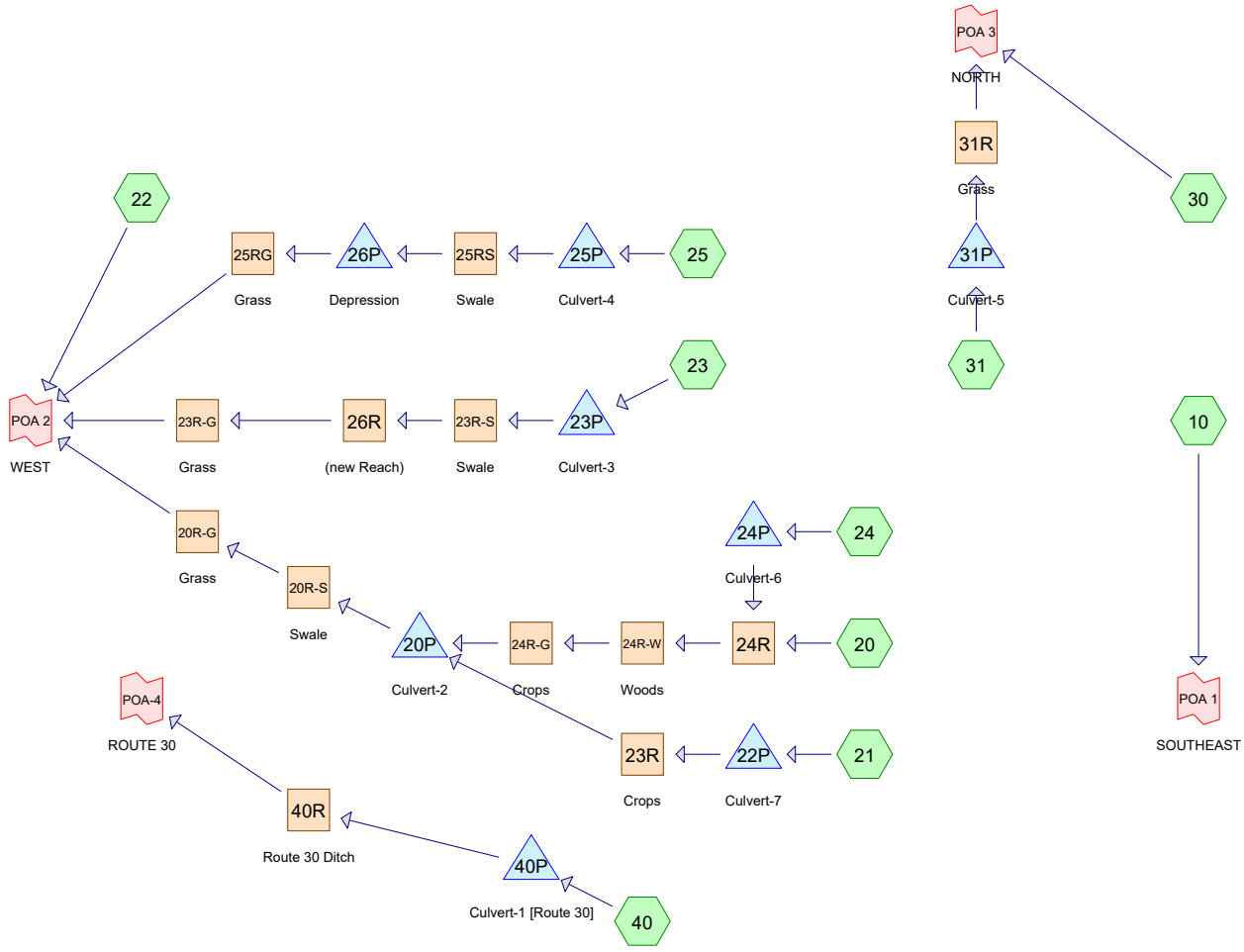
Inflow Area = 16.5 ac, 0.00% Impervious, Inflow Depth = 4.18" for 100-Year event
Inflow = 57.2 cfs @ 12.26 hrs, Volume= 5.8 af
Primary = 57.2 cfs @ 12.26 hrs, Volume= 5.8 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 4: Route 30

Inflow Area = 6.0 ac, 0.00% Impervious, Inflow Depth = 4.39" for 100-Year event
Inflow = 35.8 cfs @ 12.04 hrs, Volume= 2.2 af
Primary = 35.8 cfs @ 12.04 hrs, Volume= 2.2 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs



Subcat Reach Pond Link

Routing Diagram for 117 Bliss Rd NY_Hydrocad Post_090419_CS
Prepared by Borrego Solar Systems, Inc., Printed 9/6/2019

Area Listing (all nodes)

Area (acres)	CN	Description (subcatchment-numbers)
2.8	48	Brush, Good, HSG B (10, 20, 21, 22, 25)
10.9	73	Brush, Good, HSG D (10, 20, 21, 24, 25, 30, 31)
0.1	89	Dirt roads, HSG D (40)
0.8	96	Gravel surface, HSG B (20, 21, 22, 23, 24, 25, 30)
1.8	96	Gravel surface, HSG D (20, 22, 23, 24, 25, 30, 31, 40)
4.7	58	Meadow, non-grazed, HSG B (20, 21, 22, 23, 24)
37.4	78	Meadow, non-grazed, HSG D (10, 20, 21, 22, 23, 24, 25, 30, 31)
0.0	98	Paved parking, HSG B (24)
0.0	98	Paved parking, HSG D (20, 22, 23, 24)
8.5	78	Row crops, straight row, Good, HSG B (20, 21, 22, 23, 25, 30, 40)
24.8	89	Row crops, straight row, Good, HSG D (10, 20, 21, 22, 23, 25, 30, 31, 40)
9.3	55	Woods, Good, HSG B (10, 20, 21, 22, 25, 30, 40)
28.9	77	Woods, Good, HSG D (10, 20, 21, 22, 25, 30, 40)
130.2	**77**	**TOTAL AREA**

Soil Listing (all nodes)

Area (acres)	Soil Group	Subcatchment Numbers
0.0	HSG A	
26.3	HSG B	10, 20, 21, 22, 23, 24, 25, 30, 40
0.0	HSG C	
103.9	HSG D	10, 20, 21, 22, 23, 24, 25, 30, 31, 40
0.0	Other	
130.2		**TOTAL AREA**

Ground Covers (all nodes)

HSG-A (acres)	HSG-B (acres)	HSG-C (acres)	HSG-D (acres)	Other (acres)	Total (acres)	Ground Cover	Subcatchment Numbers
0.0	2.8	0.0	10.9	0.0	13.8	Brush, Good	10, 20, 21, 22, 24, 25, 30, 31
0.0	0.0	0.0	0.1	0.0	0.1	Dirt roads	40
0.0	0.8	0.0	1.8	0.0	2.7	Gravel surface	20, 21, 22, 23, 24, 25, 30, 31, 40
0.0	4.7	0.0	37.4	0.0	42.1	Meadow, non-grazed	10, 20, 21, 22, 23, 24, 25, 30, 31
0.0	0.0	0.0	0.0	0.0	0.0	Paved parking	20, 22, 23, 24
0.0	8.5	0.0	24.8	0.0	33.3	Row crops, straight row, Good	10, 20, 21, 22, 23, 25, 30, 31, 40
0.0	9.3	0.0	28.9	0.0	38.2	Woods, Good	10, 20, 21, 22, 25, 30, 40
0.0	**26.3**	**0.0**	**103.9**	**0.0**	**130.2**	**TOTAL AREA**	

Pipe Listing (all nodes)

Line#	Node Number	In-Invert (feet)	Out-Invert (feet)	Length (feet)	Slope (ft/ft)	n	Diam/Width (inches)	Height (inches)	Inside-Fill (inches)
1	20P	681.50	681.00	35.0	0.0143	0.012	12.0	0.0	0.0
2	22P	728.20	727.80	35.0	0.0114	0.012	18.0	0.0	0.0
3	23P	706.00	704.50	31.0	0.0484	0.012	12.0	0.0	0.0
4	24P	821.00	820.50	57.0	0.0088	0.012	12.0	0.0	0.0
5	25P	733.50	733.00	25.0	0.0200	0.012	12.0	0.0	0.0
6	31P	806.00	805.70	25.0	0.0120	0.012	12.0	0.0	0.0
7	40P	663.10	662.30	95.0	0.0084	0.012	12.0	0.0	0.0

Summary for Subcatchment 10:

Runoff = 11.8 cfs @ 12.17 hrs, Volume= 1.1 af, Depth= 0.53"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
1.1	48	Brush, Good, HSG B
3.1	73	Brush, Good, HSG D
3.7	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
4.1	55	Woods, Good, HSG B
12.6	77	Woods, Good, HSG D
24.6	72	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 20:

Runoff = 18.5 cfs @ 12.47 hrs, Volume= 2.6 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.8	48	Brush, Good, HSG B
5.1	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.6	96	Gravel surface, HSG D
0.7	58	Meadow, non-grazed, HSG B
9.0	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
5.0	78	Row crops, straight row, Good, HSG B
8.3	89	Row crops, straight row, Good, HSG D
1.0	55	Woods, Good, HSG B
8.3	77	Woods, Good, HSG D
38.9	78	Weighted Average
38.9		99.98% Pervious Area
0.0		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	50	0.0010	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
4.8	580	0.0840	2.0		**Shallow Concentrated Flow, Solar Area** Short Grass Pasture Kv= 7.0 fps
9.7	550	0.0360	0.9		**Shallow Concentrated Flow, Stumps Remain** Woodland Kv= 5.0 fps
45.2	1,180	Total			

Summary for Subcatchment 21:

Runoff = 3.4 cfs @ 12.25 hrs, Volume= 0.4 af, Depth= 0.61"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.3	48	Brush, Good, HSG B
1.0	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.0	58	Meadow, non-grazed, HSG B
0.7	78	Meadow, non-grazed, HSG D
1.2	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
0.8	55	Woods, Good, HSG B
2.8	77	Woods, Good, HSG D
7.0	74	Weighted Average
7.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0040	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
1.0	71	0.0300	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.2	474	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	64	0.1100	2.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	564	0.0250	2.4		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.3	1,223	Total			

Summary for Subcatchment 22:

Runoff = 27.3 cfs @ 12.10 hrs, Volume= 1.9 af, Depth= 1.01"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.0	48	Brush, Good, HSG B
0.1	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
1.0	58	Meadow, non-grazed, HSG B
8.5	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
10.8	89	Row crops, straight row, Good, HSG D
0.0	55	Woods, Good, HSG B
2.2	77	Woods, Good, HSG D
23.0	82	Weighted Average
23.0		100.00% Pervious Area
0.0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0800	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
8.1	807	0.0560	1.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.8	403	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.2	1,260	Total			

Summary for Subcatchment 23:

Runoff = 1.8 cfs @ 12.07 hrs, Volume= 0.1 af, Depth= 0.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.1	96	Gravel surface, HSG B
0.3	96	Gravel surface, HSG D
2.9	58	Meadow, non-grazed, HSG B
1.3	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
4.7	67	Weighted Average
4.7		99.80% Pervious Area
0.0		0.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0980	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
3.8	402	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	304	0.0130	1.6	4.9	**Trap/Vee/Rect Channel Flow, Roadside swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
11.8	756	Total			

Summary for Subcatchment 24:

Runoff = 3.8 cfs @ 12.19 hrs, Volume= 0.3 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.0	58	Meadow, non-grazed, HSG B
5.1	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG B
0.0	98	Paved parking, HSG D
5.2	78	Weighted Average
5.2		99.73% Pervious Area
0.0		0.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0140	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
13.1	1,227	0.0500	1.6		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
23.8	1,277	Total			

Summary for Subcatchment 25:

Runoff = 0.8 cfs @ 12.18 hrs, Volume= 0.1 af, Depth= 0.25"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.7	48	Brush, Good, HSG B
0.7	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.3	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
2.7	55	Woods, Good, HSG B
0.5	77	Woods, Good, HSG D
5.4	63	Weighted Average
5.4		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0300	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
1.2	80	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	500	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	103	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.5	733	Total			

Summary for Subcatchment 30:

Runoff = 5.9 cfs @ 12.21 hrs, Volume= 0.6 af, Depth= 0.75"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
1.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
5.4	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.1	89	Row crops, straight row, Good, HSG D
0.4	55	Woods, Good, HSG B
1.8	77	Woods, Good, HSG D
9.0	77	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0220	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
16.7	1,540	0.0480	1.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.6	1,590	Total			

Summary for Subcatchment 31:

Runoff = 3.1 cfs @ 12.11 hrs, Volume= 0.2 af, Depth= 0.79"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.1	96	Gravel surface, HSG D
3.4	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
3.5	78	Weighted Average
3.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0120	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
6.1	396	0.0240	1.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.5	446	Total			

Summary for Subcatchment 40:

Runoff = 5.6 cfs @ 12.64 hrs, Volume= 0.9 af, Depth= 1.19"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 2-Year Rainfall=2.51"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
0.3	96	Gravel surface, HSG D
2.0	78	Row crops, straight row, Good, HSG B
5.6	89	Row crops, straight row, Good, HSG D
0.3	55	Woods, Good, HSG B
0.8	77	Woods, Good, HSG D
9.0	85	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
2.7	180	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	1,500	0.0710	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
1.0	188	0.0500	3.2	9.7	**Trap/Vee/Rect Channel Flow, Roadside Swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
60.3	1,918	Total			

Summary for Reach 20R-G: Grass

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 0.76" for 2-Year event
Inflow = 13.0 cfs @ 14.10 hrs, Volume= 3.2 af
Outflow = 13.0 cfs @ 14.14 hrs, Volume= 3.2 af, Atten= 0%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.8 fps, Min. Travel Time= 1.6 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 3.1 min

Peak Storage= 1,238 cf @ 14.11 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 2.0' Flow Area= 400.0 sf, Capacity= 5,078.6 cfs

100.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 300.00'
Length= 169.0' Slope= 0.0609 '/'
Inlet Invert= 679.00', Outlet Invert= 668.70'

‡

Summary for Reach 20R-S: Swale

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 0.76" for 2-Year event
Inflow = 13.0 cfs @ 14.07 hrs, Volume= 3.2 af
Outflow = 13.0 cfs @ 14.10 hrs, Volume= 3.2 af, Atten= 0%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.4 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 0.8 min

Peak Storage= 345 cf @ 14.09 hrs
Average Depth at Peak Storage= 0.9'
Bank-Full Depth= 2.0' Flow Area= 18.0 sf, Capacity= 66.5 cfs

3.00' x 2.00' deep channel, n= 0.078 Riprap, 12-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 64.0' Slope= 0.0313 '/'
Inlet Invert= 681.00', Outlet Invert= 679.00'

‡

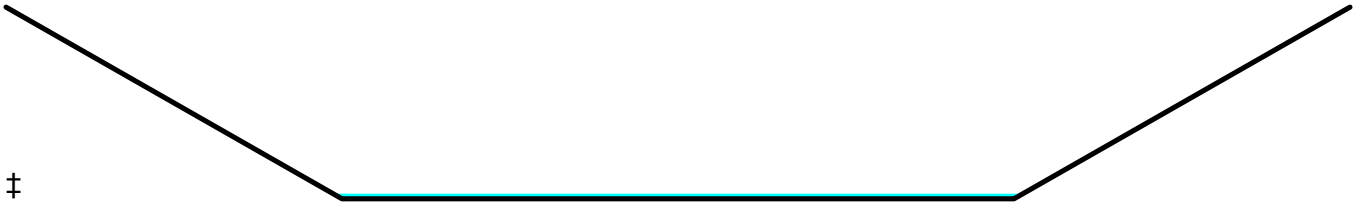
Summary for Reach 23R: Crops

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 3.2 cfs @ 12.31 hrs, Volume= 0.4 af
Outflow = 2.5 cfs @ 12.70 hrs, Volume= 0.4 af, Atten= 22%, Lag= 23.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.9 fps, Min. Travel Time= 13.3 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 24.7 min

Peak Storage= 2,015 cf @ 12.47 hrs
Average Depth at Peak Storage= 0.0'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,304.4 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 752.0' Slope= 0.0616 '/'
Inlet Invert= 727.80', Outlet Invert= 681.50'



‡

Summary for Reach 23R-G: Grass

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 1.6 cfs @ 12.19 hrs, Volume= 0.1 af
Outflow = 1.5 cfs @ 12.27 hrs, Volume= 0.1 af, Atten= 4%, Lag= 4.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.1 fps, Min. Travel Time= 2.8 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 5.8 min

Peak Storage= 252 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.0'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 733.8 cfs

40.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 182.0' Slope= 0.0665 '/'
Inlet Invert= 681.50', Outlet Invert= 669.40'

‡

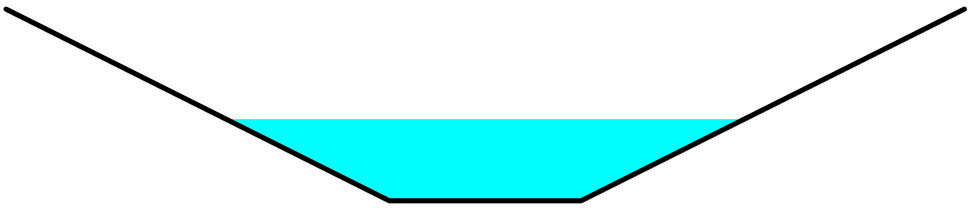
Summary for Reach 23R-S: Swale

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 1.8 cfs @ 12.08 hrs, Volume= 0.1 af
Outflow = 1.7 cfs @ 12.14 hrs, Volume= 0.1 af, Atten= 6%, Lag= 4.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.2 fps, Min. Travel Time= 2.1 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 5.2 min

Peak Storage= 213 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.4'
Bank-Full Depth= 1.0' Flow Area= 3.0 sf, Capacity= 10.5 cfs

1.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 5.00'
Length= 270.0' Slope= 0.0585 '/'
Inlet Invert= 705.50', Outlet Invert= 689.70'



Summary for Reach 24R:

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 20.4 cfs @ 12.43 hrs, Volume= 2.9 af
Outflow = 16.9 cfs @ 12.97 hrs, Volume= 2.9 af, Atten= 17%, Lag= 32.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.0 fps, Min. Travel Time= 18.7 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 49.3 min

Peak Storage= 19,078 cf @ 12.66 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,322.5 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass (cultivated farm land)
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 2,220.0' Slope= 0.0633 '/'
Inlet Invert= 822.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-G: Crops

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 0.79" for 2-Year event
Inflow = 13.2 cfs @ 13.69 hrs, Volume= 2.9 af
Outflow = 12.5 cfs @ 14.07 hrs, Volume= 2.9 af, Atten= 5%, Lag= 23.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.9 fps, Min. Travel Time= 12.5 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 28.3 min

Peak Storage= 9,412 cf @ 13.87 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,444.6 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 1,397.0' Slope= 0.0755 '/'
Inlet Invert= 787.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-W: Woods

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 0.79" for 2-Year event
Inflow = 16.9 cfs @ 12.97 hrs, Volume= 2.9 af
Outflow = 13.2 cfs @ 13.69 hrs, Volume= 2.9 af, Atten= 22%, Lag= 43.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.3 fps, Min. Travel Time= 24.2 min
Avg. Velocity = 0.1 fps, Avg. Travel Time= 58.8 min

Peak Storage= 19,209 cf @ 13.29 hrs
Average Depth at Peak Storage= 0.3'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 91.5 cfs

100.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 480.0' Slope= 0.0396 '/'
Inlet Invert= 806.00', Outlet Invert= 787.00'

‡

Summary for Reach 25RG: Grass

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 0.7 cfs @ 12.22 hrs, Volume= 0.1 af
Outflow = 0.4 cfs @ 12.92 hrs, Volume= 0.1 af, Atten= 46%, Lag= 41.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.6 fps, Min. Travel Time= 23.3 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 29.5 min

Peak Storage= 564 cf @ 12.52 hrs
Average Depth at Peak Storage= 0.0'
Bank-Full Depth= 1.0' Flow Area= 100.0 sf, Capacity= 786.7 cfs

50.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 150.00'
Length= 848.0' Slope= 0.0590 '/'
Inlet Invert= 725.00', Outlet Invert= 675.00'

‡

Summary for Reach 25RS: Swale

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 0.8 cfs @ 12.18 hrs, Volume= 0.1 af
Outflow = 0.8 cfs @ 12.22 hrs, Volume= 0.1 af, Atten= 1%, Lag= 2.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.1 fps, Min. Travel Time= 1.3 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 3.0 min

Peak Storage= 59 cf @ 12.20 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 1.0' Flow Area= 7.0 sf, Capacity= 22.2 cfs

4.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 10.00'
Length= 85.0' Slope= 0.0365 '/'
Inlet Invert= 733.00', Outlet Invert= 729.90'

‡

Summary for Reach 26R: (new Reach)

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 1.7 cfs @ 12.14 hrs, Volume= 0.1 af
Outflow = 1.6 cfs @ 12.19 hrs, Volume= 0.1 af, Atten= 5%, Lag= 2.8 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.7 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 4.3 min

Peak Storage= 147 cf @ 12.16 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 2.0' Flow Area= 16.0 sf, Capacity= 92.5 cfs

4.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 151.0' Slope= 0.0543 '/'
Inlet Invert= 689.70', Outlet Invert= 681.50'

Summary for Reach 31R: Grass

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 3.0 cfs @ 12.14 hrs, Volume= 0.2 af
Outflow = 2.9 cfs @ 12.25 hrs, Volume= 0.2 af, Atten= 5%, Lag= 6.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.2 fps, Min. Travel Time= 3.7 min
Avg. Velocity = 0.1 fps, Avg. Travel Time= 12.6 min

Peak Storage= 644 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 44.5 cfs

40.00' x 1.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 50.0' Slope= 0.0020 '/'
Inlet Invert= 805.50', Outlet Invert= 805.40'

‡

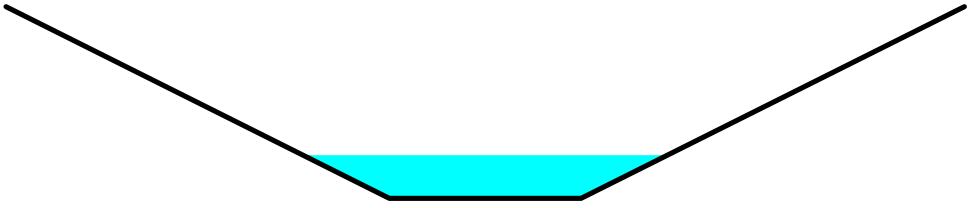
Summary for Reach 40R: Route 30 Ditch

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 1.19" for 2-Year event
Inflow = 5.6 cfs @ 12.62 hrs, Volume= 0.9 af
Outflow = 5.6 cfs @ 12.66 hrs, Volume= 0.9 af, Atten= 0%, Lag= 2.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.3 fps, Min. Travel Time= 0.6 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 1.6 min

Peak Storage= 209 cf @ 12.65 hrs
Average Depth at Peak Storage= 0.5'
Bank-Full Depth= 2.0' Flow Area= 12.0 sf, Capacity= 116.0 cfs

2.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 160.0' Slope= 0.0459 '/'
Inlet Invert= 662.34', Outlet Invert= 655.00'



Summary for Pond 20P: Culvert-2

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 0.76" for 2-Year event
Inflow = 13.0 cfs @ 14.07 hrs, Volume= 3.2 af
Outflow = 13.0 cfs @ 14.07 hrs, Volume= 3.2 af, Atten= 0%, Lag= 0.0 min
Primary = 13.0 cfs @ 14.07 hrs, Volume= 3.2 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 684.26' @ 14.07 hrs Surf.Area= 735 sf Storage= 743 cf

Plug-Flow detention time= 0.9 min calculated for 3.2 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (1,029.2 - 1,028.4)

Volume	Invert	Avail.Storage	Storage Description
#1	681.00'	3,164 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
681.00	4	0	0
682.00	67	36	36
683.00	203	135	171
684.00	591	397	568
685.00	1,137	864	1,432
686.00	2,328	1,733	3,164

Device	Routing	Invert	Outlet Devices
#1	Primary	681.50'	**12.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 681.50' / 681.00' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	684.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.0 cfs @ 14.07 hrs HW=684.26' (Free Discharge)
1=Culvert (Inlet Controls 5.7 cfs @ 7.2 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 7.3 cfs @ 1.4 fps)

Summary for Pond 22P: Culvert-7

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 0.61" for 2-Year event
Inflow = 3.4 cfs @ 12.25 hrs, Volume= 0.4 af
Outflow = 3.2 cfs @ 12.31 hrs, Volume= 0.4 af, Atten= 5%, Lag= 3.7 min
Primary = 3.2 cfs @ 12.31 hrs, Volume= 0.4 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 729.07' @ 12.31 hrs Surf.Area= 1,293 sf Storage= 914 cf

Plug-Flow detention time= 13.0 min calculated for 0.4 af (99% of inflow)
Center-of-Mass det. time= 9.3 min (905.1 - 895.9)

Volume	Invert	Avail.Storage	Storage Description
#1	728.00'	6,013 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
728.00	457	0	0
729.00	1,190	824	824
730.00	2,606	1,898	2,722
731.00	3,977	3,292	6,013

Device	Routing	Invert	Outlet Devices
#1	Primary	728.20'	**18.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 728.20' / 727.80' S= 0.0114 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	731.70'	**180.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=3.2 cfs @ 12.31 hrs HW=729.07' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 3.2 cfs @ 4.3 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 23P: Culvert-3

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.36" for 2-Year event
Inflow = 1.8 cfs @ 12.07 hrs, Volume= 0.1 af
Outflow = 1.8 cfs @ 12.08 hrs, Volume= 0.1 af, Atten= 1%, Lag= 0.5 min
Primary = 1.8 cfs @ 12.08 hrs, Volume= 0.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 706.73' @ 12.08 hrs Surf.Area= 93 sf Storage= 42 cf

Plug-Flow detention time= 0.7 min calculated for 0.1 af (100% of inflow)
Center-of-Mass det. time= 0.6 min (916.9 - 916.3)

Volume	Invert	Avail.Storage	Storage Description
#1	706.00'	3,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
706.00	23	0	0
707.00	120	72	72
708.00	571	346	417
709.00	1,324	948	1,365
710.00	3,126	2,225	3,590

Device	Routing	Invert	Outlet Devices
#1	Primary	706.00'	**12.0" Round Culvert** L= 31.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 706.00' / 704.50' S= 0.0484 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	708.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.7 cfs @ 12.08 hrs HW=706.71' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.7 cfs @ 2.9 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 24P: Culvert-6

Inflow Area = 5.2 ac, 0.27% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 3.8 cfs @ 12.19 hrs, Volume= 0.3 af
Outflow = 3.8 cfs @ 12.19 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.1 min
Primary = 3.8 cfs @ 12.19 hrs, Volume= 0.3 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 823.03' @ 12.19 hrs Surf.Area= 559 sf Storage= 14 cf

Plug-Flow detention time= 0.1 min calculated for 0.3 af (100% of inflow)
Center-of-Mass det. time= 0.1 min (876.8 - 876.7)

Volume	Invert	Avail.Storage	Storage Description
#1	823.00'	18,148 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
823.00	493	0	0
824.00	3,067	1,780	1,780
825.00	8,169	5,618	7,398
826.00	13,330	10,750	18,148

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**12.0" Round Culvert** L= 57.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 821.00' / 820.50' S= 0.0088 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	824.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=4.5 cfs @ 12.19 hrs HW=823.03' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.5 cfs @ 5.7 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 25P: Culvert-4

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 0.8 cfs @ 12.18 hrs, Volume= 0.1 af
Outflow = 0.8 cfs @ 12.18 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min
Primary = 0.8 cfs @ 12.18 hrs, Volume= 0.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 734.04' @ 12.18 hrs Surf.Area= 42 sf Storage= 2 cf

Plug-Flow detention time= 0.0 min calculated for 0.1 af (100% of inflow)
Center-of-Mass det. time= 0.0 min (950.0 - 950.0)

Volume	Invert	Avail.Storage	Storage Description
#1	734.00'	7,832 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
734.00	38	0	0
735.00	131	85	85
736.00	417	274	359
737.00	978	698	1,056
738.00	1,789	1,384	2,440
739.00	2,699	2,244	4,684
740.00	3,598	3,149	7,832

Device	Routing	Invert	Outlet Devices
#1	Primary	733.50'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 733.50' / 733.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	736.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=1.1 cfs @ 12.18 hrs HW=734.04' (Free Discharge)
└**1=Culvert** (Inlet Controls 1.1 cfs @ 2.5 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 26P: Depression

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.25" for 2-Year event
Inflow = 0.8 cfs @ 12.22 hrs, Volume= 0.1 af
Outflow = 0.7 cfs @ 12.22 hrs, Volume= 0.1 af, Atten= 0%, Lag= 0.0 min
Primary = 0.7 cfs @ 12.22 hrs, Volume= 0.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 722.02' @ 12.22 hrs Surf.Area= 193 sf Storage= 3 cf

Plug-Flow detention time= 0.1 min calculated for 0.1 af (100% of inflow)

Center-of-Mass det. time= 0.1 min (953.9 - 953.8)

Volume	Invert	Avail.Storage	Storage Description
#1	722.00'	2,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
722.00	187	0	0
723.00	515	351	351
724.00	850	683	1,034
725.00	1,250	1,050	2,084

Device	Routing	Invert	Outlet Devices
#1	Primary	722.00'	**100.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=0.6 cfs @ 12.22 hrs HW=722.02' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 0.6 cfs @ 0.3 fps)

Summary for Pond 31P: Culvert-5

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 0.79" for 2-Year event
Inflow = 3.1 cfs @ 12.11 hrs, Volume= 0.2 af
Outflow = 3.0 cfs @ 12.14 hrs, Volume= 0.2 af, Atten= 3%, Lag= 1.9 min
Primary = 3.0 cfs @ 12.14 hrs, Volume= 0.2 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 807.15' @ 12.14 hrs Surf.Area= 337 sf Storage= 292 cf

Plug-Flow detention time= 3.1 min calculated for 0.2 af (100% of inflow)
Center-of-Mass det. time= 3.1 min (874.0 - 870.9)

Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	19,462 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	184	0	0
807.00	306	245	245
808.00	517	412	657
809.00	7,488	4,003	4,659
810.00	22,117	14,803	19,462

Device	Routing	Invert	Outlet Devices
#1	Primary	806.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 806.00' / 805.70' S= 0.0120 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	808.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.0 cfs @ 12.14 hrs HW=807.14' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.0 cfs @ 3.8 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 40P: Culvert-1 [Route 30]

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 1.19" for 2-Year event
Inflow = 5.6 cfs @ 12.64 hrs, Volume= 0.9 af
Outflow = 5.6 cfs @ 12.62 hrs, Volume= 0.9 af, Atten= 0%, Lag= 0.0 min
Primary = 5.6 cfs @ 12.62 hrs, Volume= 0.9 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 665.37' @ 12.62 hrs Surf.Area= 435 sf Storage= 157 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 0.2 min (884.7 - 884.6)

Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	6,466 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	5	0	0
664.00	13	5	5
665.00	94	54	58
666.00	1,006	550	608
667.00	2,797	1,902	2,510
668.00	5,115	3,956	6,466

Device	Routing	Invert	Outlet Devices
#1	Primary	663.10'	**12.0" Round Culvert** L= 95.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.10' / 662.30' S= 0.0084 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	665.30'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.6 cfs @ 12.62 hrs HW=665.37' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.5 cfs @ 5.7 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 1.0 cfs @ 0.7 fps)

Summary for Link POA 1: SOUTHEAST

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 0.53" for 2-Year event
Inflow = 11.8 cfs @ 12.17 hrs, Volume= 1.1 af
Primary = 11.8 cfs @ 12.17 hrs, Volume= 1.1 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: WEST

Inflow Area = 84.1 ac, 0.04% Impervious, Inflow Depth > 0.77" for 2-Year event
Inflow = 27.5 cfs @ 12.11 hrs, Volume= 5.4 af
Primary = 27.5 cfs @ 12.11 hrs, Volume= 5.4 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: NORTH

Inflow Area = 12.5 ac, 0.00% Impervious, Inflow Depth = 0.76" for 2-Year event
Inflow = 8.7 cfs @ 12.23 hrs, Volume= 0.8 af
Primary = 8.7 cfs @ 12.23 hrs, Volume= 0.8 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA-4: ROUTE 30

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 1.19" for 2-Year event
Inflow = 5.6 cfs @ 12.66 hrs, Volume= 0.9 af
Primary = 5.6 cfs @ 12.66 hrs, Volume= 0.9 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10:

Runoff = 30.6 cfs @ 12.15 hrs, Volume= 2.5 af, Depth= 1.21"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
1.1	48	Brush, Good, HSG B
3.1	73	Brush, Good, HSG D
3.7	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
4.1	55	Woods, Good, HSG B
12.6	77	Woods, Good, HSG D
24.6	72	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 20:

Runoff = 39.8 cfs @ 12.45 hrs, Volume= 5.2 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.8	48	Brush, Good, HSG B
5.1	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.6	96	Gravel surface, HSG D
0.7	58	Meadow, non-grazed, HSG B
9.0	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
5.0	78	Row crops, straight row, Good, HSG B
8.3	89	Row crops, straight row, Good, HSG D
1.0	55	Woods, Good, HSG B
8.3	77	Woods, Good, HSG D
38.9	78	Weighted Average
38.9		99.98% Pervious Area
0.0		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	50	0.0010	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
4.8	580	0.0840	2.0		**Shallow Concentrated Flow, Solar Area** Short Grass Pasture Kv= 7.0 fps
9.7	550	0.0360	0.9		**Shallow Concentrated Flow, Stumps Remain** Woodland Kv= 5.0 fps
45.2	1,180	Total			

Summary for Subcatchment 21:

Runoff = 8.2 cfs @ 12.23 hrs, Volume= 0.8 af, Depth= 1.34"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.3	48	Brush, Good, HSG B
1.0	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.0	58	Meadow, non-grazed, HSG B
0.7	78	Meadow, non-grazed, HSG D
1.2	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
0.8	55	Woods, Good, HSG B
2.8	77	Woods, Good, HSG D
7.0	74	Weighted Average
7.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0040	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
1.0	71	0.0300	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.2	474	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	64	0.1100	2.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	564	0.0250	2.4		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.3	1,223	Total			

Summary for Subcatchment 22:

Runoff = 52.4 cfs @ 12.10 hrs, Volume= 3.6 af, Depth= 1.90"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.0	48	Brush, Good, HSG B
0.1	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
1.0	58	Meadow, non-grazed, HSG B
8.5	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
10.8	89	Row crops, straight row, Good, HSG D
0.0	55	Woods, Good, HSG B
2.2	77	Woods, Good, HSG D
23.0	82	Weighted Average
23.0		100.00% Pervious Area
0.0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0800	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
8.1	807	0.0560	1.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.8	403	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.2	1,260	Total			

Summary for Subcatchment 23:

Runoff = 5.9 cfs @ 12.05 hrs, Volume= 0.4 af, Depth= 0.93"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.1	96	Gravel surface, HSG B
0.3	96	Gravel surface, HSG D
2.9	58	Meadow, non-grazed, HSG B
1.3	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
4.7	67	Weighted Average
4.7		99.80% Pervious Area
0.0		0.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0980	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
3.8	402	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	304	0.0130	1.6	4.9	**Trap/Vee/Rect Channel Flow, Roadside swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
11.8	756	Total			

Summary for Subcatchment 24:

Runoff = 8.2 cfs @ 12.18 hrs, Volume= 0.7 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.0	58	Meadow, non-grazed, HSG B
5.1	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG B
0.0	98	Paved parking, HSG D
5.2	78	Weighted Average
5.2		99.73% Pervious Area
0.0		0.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0140	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
13.1	1,227	0.0500	1.6		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
23.8	1,277	Total			

Summary for Subcatchment 25:

Runoff = 3.7 cfs @ 12.14 hrs, Volume= 0.3 af, Depth= 0.73"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.7	48	Brush, Good, HSG B
0.7	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.3	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
2.7	55	Woods, Good, HSG B
0.5	77	Woods, Good, HSG D
5.4	63	Weighted Average
5.4		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0300	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
1.2	80	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	500	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	103	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.5	733	Total			

Summary for Subcatchment 30:

Runoff = 12.9 cfs @ 12.20 hrs, Volume= 1.2 af, Depth= 1.54"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
1.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
5.4	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.1	89	Row crops, straight row, Good, HSG D
0.4	55	Woods, Good, HSG B
1.8	77	Woods, Good, HSG D
9.0	77	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0220	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
16.7	1,540	0.0480	1.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.6	1,590	Total			

Summary for Subcatchment 31:

Runoff = 6.6 cfs @ 12.10 hrs, Volume= 0.5 af, Depth= 1.60"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.1	96	Gravel surface, HSG D
3.4	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
3.5	78	Weighted Average
3.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0120	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
6.1	396	0.0240	1.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.5	446	Total			

Summary for Subcatchment 40:

Runoff = 10.3 cfs @ 12.63 hrs, Volume= 1.6 af, Depth= 2.14"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 10-Year Rainfall=3.64"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
0.3	96	Gravel surface, HSG D
2.0	78	Row crops, straight row, Good, HSG B
5.6	89	Row crops, straight row, Good, HSG D
0.3	55	Woods, Good, HSG B
0.8	77	Woods, Good, HSG D
9.0	85	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
2.7	180	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	1,500	0.0710	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
1.0	188	0.0500	3.2	9.7	**Trap/Vee/Rect Channel Flow, Roadside Swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
60.3	1,918	Total			

Summary for Reach 20R-G: Grass

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 34.2 cfs @ 13.58 hrs, Volume= 6.6 af
Outflow = 34.1 cfs @ 13.62 hrs, Volume= 6.6 af, Atten= 0%, Lag= 1.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 2.7 min

Peak Storage= 2,268 cf @ 13.60 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 2.0' Flow Area= 400.0 sf, Capacity= 5,078.6 cfs

100.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 300.00'
Length= 169.0' Slope= 0.0609 '/'
Inlet Invert= 679.00', Outlet Invert= 668.70'

‡

Summary for Reach 20R-S: Swale

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 34.2 cfs @ 13.57 hrs, Volume= 6.6 af
Outflow = 34.2 cfs @ 13.58 hrs, Volume= 6.6 af, Atten= 0%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.1 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.5 fps, Avg. Travel Time= 0.7 min

Peak Storage= 702 cf @ 13.58 hrs
Average Depth at Peak Storage= 1.5'
Bank-Full Depth= 2.0' Flow Area= 18.0 sf, Capacity= 66.5 cfs

3.00' x 2.00' deep channel, n= 0.078 Riprap, 12-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 64.0' Slope= 0.0313 '/'
Inlet Invert= 681.00', Outlet Invert= 679.00'

‡

Summary for Reach 23R: Crops

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 1.33" for 10-Year event
Inflow = 7.5 cfs @ 12.31 hrs, Volume= 0.8 af
Outflow = 6.9 cfs @ 12.56 hrs, Volume= 0.8 af, Atten= 9%, Lag= 15.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.4 fps, Min. Travel Time= 9.1 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 23.2 min

Peak Storage= 3,740 cf @ 12.41 hrs
Average Depth at Peak Storage= 0.0'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,304.4 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 752.0' Slope= 0.0616 '/'
Inlet Invert= 727.80', Outlet Invert= 681.50'

‡

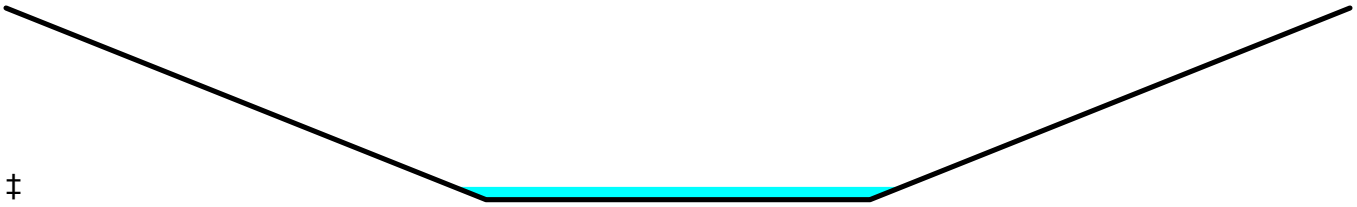
Summary for Reach 23R-G: Grass

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 5.1 cfs @ 12.17 hrs, Volume= 0.4 af
Outflow = 4.9 cfs @ 12.22 hrs, Volume= 0.4 af, Atten= 3%, Lag= 3.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.7 fps, Min. Travel Time= 1.8 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 5.2 min

Peak Storage= 531 cf @ 12.19 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 733.8 cfs

40.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 182.0' Slope= 0.0665 '/'
Inlet Invert= 681.50', Outlet Invert= 669.40'



‡

Summary for Reach 23R-S: Swale

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 5.8 cfs @ 12.10 hrs, Volume= 0.4 af
Outflow = 5.3 cfs @ 12.14 hrs, Volume= 0.4 af, Atten= 10%, Lag= 2.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.9 fps, Min. Travel Time= 1.5 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 4.1 min

Peak Storage= 499 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.7'
Bank-Full Depth= 1.0' Flow Area= 3.0 sf, Capacity= 10.5 cfs

1.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 5.00'
Length= 270.0' Slope= 0.0585 '/'
Inlet Invert= 705.50', Outlet Invert= 689.70'

Summary for Reach 24R:

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth = 1.60" for 10-Year event
Inflow = 45.5 cfs @ 12.44 hrs, Volume= 5.9 af
Outflow = 40.9 cfs @ 12.82 hrs, Volume= 5.9 af, Atten= 10%, Lag= 22.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 13.4 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 41.9 min

Peak Storage= 33,108 cf @ 12.59 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,322.5 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass (cultivated farm land)
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 2,220.0' Slope= 0.0633 '/'
Inlet Invert= 822.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-G: Crops

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 1.60" for 10-Year event
Inflow = 34.1 cfs @ 13.32 hrs, Volume= 5.9 af
Outflow = 32.9 cfs @ 13.57 hrs, Volume= 5.9 af, Atten= 4%, Lag= 15.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.7 fps, Min. Travel Time= 8.7 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 24.0 min

Peak Storage= 17,155 cf @ 13.43 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,444.6 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 1,397.0' Slope= 0.0755 '/'
Inlet Invert= 787.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-W: Woods

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 1.60" for 10-Year event
Inflow = 40.9 cfs @ 12.82 hrs, Volume= 5.9 af
Outflow = 34.1 cfs @ 13.32 hrs, Volume= 5.9 af, Atten= 17%, Lag= 30.2 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.5 fps, Min. Travel Time= 17.7 min
Avg. Velocity = 0.2 fps, Avg. Travel Time= 50.2 min

Peak Storage= 36,309 cf @ 13.02 hrs
Average Depth at Peak Storage= 0.6'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 91.5 cfs

100.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 480.0' Slope= 0.0396 '/'
Inlet Invert= 806.00', Outlet Invert= 787.00'

‡

Summary for Reach 25RG: Grass

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.73" for 10-Year event
Inflow = 3.6 cfs @ 12.18 hrs, Volume= 0.3 af
Outflow = 2.7 cfs @ 12.50 hrs, Volume= 0.3 af, Atten= 26%, Lag= 19.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.2 fps, Min. Travel Time= 11.6 min
Avg. Velocity = 0.5 fps, Avg. Travel Time= 27.1 min

Peak Storage= 1,860 cf @ 12.30 hrs
Average Depth at Peak Storage= 0.0'
Bank-Full Depth= 1.0' Flow Area= 100.0 sf, Capacity= 786.7 cfs

50.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 150.00'
Length= 848.0' Slope= 0.0590 '/'
Inlet Invert= 725.00', Outlet Invert= 675.00'

‡

Summary for Reach 25RS: Swale

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.73" for 10-Year event
Inflow = 3.7 cfs @ 12.16 hrs, Volume= 0.3 af
Outflow = 3.6 cfs @ 12.18 hrs, Volume= 0.3 af, Atten= 2%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 1.9 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 2.1 min

Peak Storage= 167 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.4'
Bank-Full Depth= 1.0' Flow Area= 7.0 sf, Capacity= 22.2 cfs

4.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 10.00'
Length= 85.0' Slope= 0.0365 '/'
Inlet Invert= 733.00', Outlet Invert= 729.90'

‡

Summary for Reach 26R: (new Reach)

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 5.3 cfs @ 12.14 hrs, Volume= 0.4 af
Outflow = 5.1 cfs @ 12.17 hrs, Volume= 0.4 af, Atten= 3%, Lag= 1.6 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.5 fps, Min. Travel Time= 1.0 min
Avg. Velocity = 0.8 fps, Avg. Travel Time= 3.3 min

Peak Storage= 315 cf @ 12.15 hrs
Average Depth at Peak Storage= 0.4'
Bank-Full Depth= 2.0' Flow Area= 16.0 sf, Capacity= 92.5 cfs

4.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 151.0' Slope= 0.0543 '/'
Inlet Invert= 689.70', Outlet Invert= 681.50'

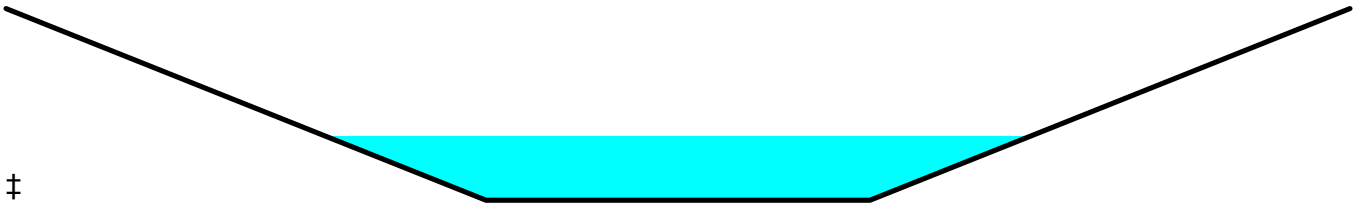
Summary for Reach 31R: Grass

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 1.60" for 10-Year event
Inflow = 5.2 cfs @ 12.20 hrs, Volume= 0.5 af
Outflow = 5.1 cfs @ 12.29 hrs, Volume= 0.5 af, Atten= 1%, Lag= 5.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.3 fps, Min. Travel Time= 3.1 min
Avg. Velocity = 0.1 fps, Avg. Travel Time= 10.6 min

Peak Storage= 951 cf @ 12.24 hrs
Average Depth at Peak Storage= 0.3'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 44.5 cfs

40.00' x 1.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 50.0' Slope= 0.0020 '/'
Inlet Invert= 805.50', Outlet Invert= 805.40'



‡

Summary for Reach 40R: Route 30 Ditch

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 2.14" for 10-Year event
Inflow = 10.3 cfs @ 12.63 hrs, Volume= 1.6 af
Outflow = 10.3 cfs @ 12.65 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.9 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 5.1 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 1.9 fps, Avg. Travel Time= 1.4 min

Peak Storage= 321 cf @ 12.64 hrs
Average Depth at Peak Storage= 0.6'
Bank-Full Depth= 2.0' Flow Area= 12.0 sf, Capacity= 116.0 cfs

2.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 160.0' Slope= 0.0459 '/'
Inlet Invert= 662.34', Outlet Invert= 655.00'

Summary for Pond 20P: Culvert-2

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 34.2 cfs @ 13.57 hrs, Volume= 6.6 af
Outflow = 34.2 cfs @ 13.57 hrs, Volume= 6.6 af, Atten= 0%, Lag= 0.2 min
Primary = 34.2 cfs @ 13.57 hrs, Volume= 6.6 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 684.65' @ 13.57 hrs Surf.Area= 945 sf Storage= 1,066 cf

Plug-Flow detention time= 0.8 min calculated for 6.6 af (100% of inflow)
Center-of-Mass det. time= 0.8 min (973.8 - 973.0)

Volume	Invert	Avail.Storage	Storage Description
#1	681.00'	3,164 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
681.00	4	0	0
682.00	67	36	36
683.00	203	135	171
684.00	591	397	568
685.00	1,137	864	1,432
686.00	2,328	1,733	3,164

Device	Routing	Invert	Outlet Devices
#1	Primary	681.50'	**12.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 681.50' / 681.00' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	684.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=34.1 cfs @ 13.57 hrs HW=684.65' (Free Discharge)
1=Culvert (Inlet Controls 6.2 cfs @ 7.8 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 28.0 cfs @ 2.2 fps)

Summary for Pond 22P: Culvert-7

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 1.34" for 10-Year event
Inflow = 8.2 cfs @ 12.23 hrs, Volume= 0.8 af
Outflow = 7.5 cfs @ 12.31 hrs, Volume= 0.8 af, Atten= 8%, Lag= 5.0 min
Primary = 7.5 cfs @ 12.31 hrs, Volume= 0.8 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 729.75' @ 12.31 hrs Surf.Area= 2,248 sf Storage= 2,108 cf

Plug-Flow detention time= 9.0 min calculated for 0.8 af (100% of inflow)
Center-of-Mass det. time= 6.9 min (877.5 - 870.7)

Volume	Invert	Avail.Storage	Storage Description
#1	728.00'	6,013 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
728.00	457	0	0
729.00	1,190	824	824
730.00	2,606	1,898	2,722
731.00	3,977	3,292	6,013

Device	Routing	Invert	Outlet Devices
#1	Primary	728.20'	**18.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 728.20' / 727.80' S= 0.0114 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	731.70'	**180.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=7.5 cfs @ 12.31 hrs HW=729.74' (Free Discharge)
↑—**1=Culvert** (Barrel Controls 7.5 cfs @ 5.1 fps)
└—**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 23P: Culvert-3

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 0.93" for 10-Year event
Inflow = 5.9 cfs @ 12.05 hrs, Volume= 0.4 af
Outflow = 5.8 cfs @ 12.10 hrs, Volume= 0.4 af, Atten= 0%, Lag= 2.7 min
Primary = 5.8 cfs @ 12.10 hrs, Volume= 0.4 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 708.08' @ 12.09 hrs Surf.Area= 634 sf Storage= 468 cf

Plug-Flow detention time= 0.7 min calculated for 0.4 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (879.5 - 878.8)

Volume	Invert	Avail.Storage	Storage Description
#1	706.00'	3,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
706.00	23	0	0
707.00	120	72	72
708.00	571	346	417
709.00	1,324	948	1,365
710.00	3,126	2,225	3,590

Device	Routing	Invert	Outlet Devices
#1	Primary	706.00'	**12.0" Round Culvert** L= 31.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 706.00' / 704.50' S= 0.0484 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	708.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.7 cfs @ 12.10 hrs HW=708.07' (Free Discharge)
1=Culvert (Inlet Controls 4.7 cfs @ 6.0 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 1.0 cfs @ 0.7 fps)

Summary for Pond 24P: Culvert-6

Inflow Area = 5.2 ac, 0.27% Impervious, Inflow Depth = 1.60" for 10-Year event
Inflow = 8.2 cfs @ 12.18 hrs, Volume= 0.7 af
Outflow = 6.4 cfs @ 12.31 hrs, Volume= 0.7 af, Atten= 21%, Lag= 8.1 min
Primary = 6.4 cfs @ 12.31 hrs, Volume= 0.7 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 824.05' @ 12.32 hrs Surf.Area= 3,340 sf Storage= 1,951 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= 1.4 min (857.0 - 855.6)

Volume	Invert	Avail.Storage	Storage Description
#1	823.00'	18,148 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
823.00	493	0	0
824.00	3,067	1,780	1,780
825.00	8,169	5,618	7,398
826.00	13,330	10,750	18,148

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**12.0" Round Culvert** L= 57.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 821.00' / 820.50' S= 0.0088 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	824.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=6.3 cfs @ 12.31 hrs HW=824.05' (Free Discharge)
1=Culvert (Barrel Controls 5.8 cfs @ 7.4 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 0.5 cfs @ 0.6 fps)

Summary for Pond 25P: Culvert-4

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.73" for 10-Year event
Inflow = 3.7 cfs @ 12.14 hrs, Volume= 0.3 af
Outflow = 3.7 cfs @ 12.16 hrs, Volume= 0.3 af, Atten= 2%, Lag= 0.9 min
Primary = 3.7 cfs @ 12.16 hrs, Volume= 0.3 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 734.94' @ 12.16 hrs Surf.Area= 125 sf Storage= 77 cf

Plug-Flow detention time= 0.3 min calculated for 0.3 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (900.5 - 900.3)

Volume	Invert	Avail.Storage	Storage Description
#1	734.00'	7,832 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
734.00	38	0	0
735.00	131	85	85
736.00	417	274	359
737.00	978	698	1,056
738.00	1,789	1,384	2,440
739.00	2,699	2,244	4,684
740.00	3,598	3,149	7,832

Device	Routing	Invert	Outlet Devices
#1	Primary	733.50'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 733.50' / 733.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	736.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=3.6 cfs @ 12.16 hrs HW=734.93' (Free Discharge)
└**1=Culvert** (Inlet Controls 3.6 cfs @ 4.6 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 26P: Depression

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 0.73" for 10-Year event
Inflow = 3.6 cfs @ 12.18 hrs, Volume= 0.3 af
Outflow = 3.6 cfs @ 12.18 hrs, Volume= 0.3 af, Atten= 0%, Lag= 0.0 min
Primary = 3.6 cfs @ 12.18 hrs, Volume= 0.3 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 722.06' @ 12.18 hrs Surf.Area= 206 sf Storage= 12 cf

Plug-Flow detention time= 0.1 min calculated for 0.3 af (100% of inflow)

Center-of-Mass det. time= 0.1 min (902.9 - 902.8)

Volume	Invert	Avail.Storage	Storage Description
#1	722.00'	2,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
722.00	187	0	0
723.00	515	351	351
724.00	850	683	1,034
725.00	1,250	1,050	2,084

Device	Routing	Invert	Outlet Devices
#1	Primary	722.00'	**100.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=3.5 cfs @ 12.18 hrs HW=722.06' (Free Discharge)
1=Broad-Crested Rectangular Weir (Weir Controls 3.5 cfs @ 0.6 fps)

Summary for Pond 31P: Culvert-5

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 1.60" for 10-Year event
Inflow = 6.6 cfs @ 12.10 hrs, Volume= 0.5 af
Outflow = 5.2 cfs @ 12.20 hrs, Volume= 0.5 af, Atten= 22%, Lag= 5.9 min
Primary = 5.2 cfs @ 12.20 hrs, Volume= 0.5 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 808.36' @ 12.20 hrs Surf.Area= 3,015 sf Storage= 1,289 cf

Plug-Flow detention time= 3.0 min calculated for 0.5 af (100% of inflow)
Center-of-Mass det. time= 3.0 min (852.8 - 849.7)

Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	19,462 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	184	0	0
807.00	306	245	245
808.00	517	412	657
809.00	7,488	4,003	4,659
810.00	22,117	14,803	19,462

Device	Routing	Invert	Outlet Devices
#1	Primary	806.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 806.00' / 805.70' S= 0.0120 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	808.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=5.2 cfs @ 12.20 hrs HW=808.36' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.2 cfs @ 6.6 fps)
└**2=Broad-Crested Rectangular Weir** (Controls 0.0 cfs)

Summary for Pond 40P: Culvert-1 [Route 30]

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 2.14" for 10-Year event
Inflow = 10.3 cfs @ 12.63 hrs, Volume= 1.6 af
Outflow = 10.3 cfs @ 12.63 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.0 min
Primary = 10.3 cfs @ 12.63 hrs, Volume= 1.6 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 665.52' @ 12.63 hrs Surf.Area= 569 sf Storage= 231 cf

Plug-Flow detention time= 0.2 min calculated for 1.6 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (867.9 - 867.7)

Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	6,466 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	5	0	0
664.00	13	5	5
665.00	94	54	58
666.00	1,006	550	608
667.00	2,797	1,902	2,510
668.00	5,115	3,956	6,466

Device	Routing	Invert	Outlet Devices
#1	Primary	663.10'	**12.0" Round Culvert** L= 95.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.10' / 662.30' S= 0.0084 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	665.30'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=10.2 cfs @ 12.63 hrs HW=665.52' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.7 cfs @ 5.9 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 5.6 cfs @ 1.3 fps)

Summary for Link POA 1: SOUTHEAST

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 1.21" for 10-Year event
Inflow = 30.6 cfs @ 12.15 hrs, Volume= 2.5 af
Primary = 30.6 cfs @ 12.15 hrs, Volume= 2.5 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: WEST

Inflow Area = 84.1 ac, 0.04% Impervious, Inflow Depth > 1.56" for 10-Year event
Inflow = 56.0 cfs @ 12.11 hrs, Volume= 11.0 af
Primary = 56.0 cfs @ 12.11 hrs, Volume= 11.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: NORTH

Inflow Area = 12.5 ac, 0.00% Impervious, Inflow Depth = 1.55" for 10-Year event
Inflow = 17.9 cfs @ 12.21 hrs, Volume= 1.6 af
Primary = 17.9 cfs @ 12.21 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA-4: ROUTE 30

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 2.14" for 10-Year event
Inflow = 10.3 cfs @ 12.65 hrs, Volume= 1.6 af
Primary = 10.3 cfs @ 12.65 hrs, Volume= 1.6 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Subcatchment 10:

Runoff = 83.8 cfs @ 12.14 hrs, Volume= 6.5 af, Depth= 3.17"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
1.1	48	Brush, Good, HSG B
3.1	73	Brush, Good, HSG D
3.7	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
4.1	55	Woods, Good, HSG B
12.6	77	Woods, Good, HSG D
24.6	72	Weighted Average
24.6		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
6.3	50	0.0260	0.1		**Sheet Flow,** Cultivated: Residue>20% n= 0.170 P2= 2.51"
14.6	1,456	0.0340	1.7		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
20.9	1,506	Total			

Summary for Subcatchment 20:

Runoff = 96.0 cfs @ 12.42 hrs, Volume= 12.2 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.8	48	Brush, Good, HSG B
5.1	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.6	96	Gravel surface, HSG D
0.7	58	Meadow, non-grazed, HSG B
9.0	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
5.0	78	Row crops, straight row, Good, HSG B
8.3	89	Row crops, straight row, Good, HSG D
1.0	55	Woods, Good, HSG B
8.3	77	Woods, Good, HSG D
38.9	78	Weighted Average
38.9		99.98% Pervious Area
0.0		0.02% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
30.7	50	0.0010	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
4.8	580	0.0840	2.0		**Shallow Concentrated Flow, Solar Area** Short Grass Pasture Kv= 7.0 fps
9.7	550	0.0360	0.9		**Shallow Concentrated Flow, Stumps Remain** Woodland Kv= 5.0 fps
45.2	1,180	Total			

Summary for Subcatchment 21:

Runoff = 21.5 cfs @ 12.21 hrs, Volume= 1.9 af, Depth= 3.36"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.3	48	Brush, Good, HSG B
1.0	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.0	58	Meadow, non-grazed, HSG B
0.7	78	Meadow, non-grazed, HSG D
1.2	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
0.8	55	Woods, Good, HSG B
2.8	77	Woods, Good, HSG D
7.0	74	Weighted Average
7.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
17.6	50	0.0040	0.0		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
1.0	71	0.0300	1.2		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.2	474	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
0.5	64	0.1100	2.3		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
4.0	564	0.0250	2.4		**Shallow Concentrated Flow,** Grassed Waterway Kv= 15.0 fps
27.3	1,223	Total			

Summary for Subcatchment 22:

Runoff = 114.0 cfs @ 12.09 hrs, Volume= 8.0 af, Depth= 4.18"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.0	48	Brush, Good, HSG B
0.1	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
1.0	58	Meadow, non-grazed, HSG B
8.5	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
10.8	89	Row crops, straight row, Good, HSG D
0.0	55	Woods, Good, HSG B
2.2	77	Woods, Good, HSG D
23.0	82	Weighted Average
23.0		100.00% Pervious Area
0.0		0.00% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
5.3	50	0.0800	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
8.1	807	0.0560	1.7		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.8	403	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.2	1,260	Total			

Summary for Subcatchment 23:

Runoff = 18.2 cfs @ 12.04 hrs, Volume= 1.1 af, Depth= 2.69"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.1	96	Gravel surface, HSG B
0.3	96	Gravel surface, HSG D
2.9	58	Meadow, non-grazed, HSG B
1.3	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
4.7	67	Weighted Average
4.7		99.80% Pervious Area
0.0		0.20% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
4.9	50	0.0980	0.2		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
3.8	402	0.0640	1.8		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
3.1	304	0.0130	1.6	4.9	**Trap/Vee/Rect Channel Flow, Roadside swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
11.8	756	Total			

Summary for Subcatchment 24:

Runoff = 19.5 cfs @ 12.17 hrs, Volume= 1.6 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.0	58	Meadow, non-grazed, HSG B
5.1	78	Meadow, non-grazed, HSG D
0.0	98	Paved parking, HSG B
0.0	98	Paved parking, HSG D
5.2	78	Weighted Average
5.2		99.73% Pervious Area
0.0		0.27% Impervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
10.7	50	0.0140	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
13.1	1,227	0.0500	1.6		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
23.8	1,277	Total			

Summary for Subcatchment 25:

Runoff = 14.1 cfs @ 12.12 hrs, Volume= 1.0 af, Depth= 2.32"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.7	48	Brush, Good, HSG B
0.7	73	Brush, Good, HSG D
0.3	96	Gravel surface, HSG B
0.1	96	Gravel surface, HSG D
0.3	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.0	89	Row crops, straight row, Good, HSG D
2.7	55	Woods, Good, HSG B
0.5	77	Woods, Good, HSG D
5.4	63	Weighted Average
5.4		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.8	50	0.0300	0.1		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
1.2	80	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
4.5	500	0.1400	1.9		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
1.0	103	0.1200	1.7		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
18.5	733	Total			

Summary for Subcatchment 30:

Runoff = 31.5 cfs @ 12.19 hrs, Volume= 2.7 af, Depth= 3.66"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
1.0	73	Brush, Good, HSG D
0.0	96	Gravel surface, HSG B
0.2	96	Gravel surface, HSG D
5.4	78	Meadow, non-grazed, HSG D
0.1	78	Row crops, straight row, Good, HSG B
0.1	89	Row crops, straight row, Good, HSG D
0.4	55	Woods, Good, HSG B
1.8	77	Woods, Good, HSG D
9.0	77	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
8.9	50	0.0220	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
16.7	1,540	0.0480	1.5		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
25.6	1,590	Total			

Summary for Subcatchment 31:

Runoff = 15.6 cfs @ 12.10 hrs, Volume= 1.1 af, Depth= 3.77"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.0	73	Brush, Good, HSG D
0.1	96	Gravel surface, HSG D
3.4	78	Meadow, non-grazed, HSG D
0.0	89	Row crops, straight row, Good, HSG D
3.5	78	Weighted Average
3.5		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
11.4	50	0.0120	0.1		**Sheet Flow,** Grass: Dense n= 0.240 P2= 2.51"
6.1	396	0.0240	1.1		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
17.5	446	Total			

Summary for Subcatchment 40:

Runoff = 21.5 cfs @ 12.62 hrs, Volume= 3.4 af, Depth= 4.50"

Runoff by SCS TR-20 method, UH=SCS, Weighted-CN, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Type II 24-hr 100-Year Rainfall=6.21"

Area (ac)	CN	Description
0.1	89	Dirt roads, HSG D
0.3	96	Gravel surface, HSG D
2.0	78	Row crops, straight row, Good, HSG B
5.6	89	Row crops, straight row, Good, HSG D
0.3	55	Woods, Good, HSG B
0.8	77	Woods, Good, HSG D
9.0	85	Weighted Average
9.0		100.00% Pervious Area

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
46.2	50	0.0010	0.0		**Sheet Flow,** Woods: Light underbrush n= 0.400 P2= 2.51"
2.7	180	0.0500	1.1		**Shallow Concentrated Flow,** Woodland Kv= 5.0 fps
10.4	1,500	0.0710	2.4		**Shallow Concentrated Flow,** Cultivated Straight Rows Kv= 9.0 fps
1.0	188	0.0500	3.2	9.7	**Trap/Vee/Rect Channel Flow, Roadside Swale** Bot.W=1.00' D=1.00' Z= 2.0 '/' Top.W=5.00' n= 0.069 Riprap, 6-inch
60.3	1,918	Total			

Summary for Reach 20R-G: Grass

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 3.73" for 100-Year event
Inflow = 92.8 cfs @ 13.24 hrs, Volume= 15.8 af
Outflow = 92.7 cfs @ 13.26 hrs, Volume= 15.8 af, Atten= 0%, Lag= 1.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.7 fps, Min. Travel Time= 0.8 min
Avg. Velocity = 1.3 fps, Avg. Travel Time= 2.2 min

Peak Storage= 4,282 cf @ 13.25 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 2.0' Flow Area= 400.0 sf, Capacity= 5,078.6 cfs

100.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 300.00'
Length= 169.0' Slope= 0.0609 '/'
Inlet Invert= 679.00', Outlet Invert= 668.70'

‡

Summary for Reach 20R-S: Swale

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 3.73" for 100-Year event
Inflow = 92.9 cfs @ 13.23 hrs, Volume= 15.8 af
Outflow = 92.8 cfs @ 13.24 hrs, Volume= 15.8 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 4.0 fps, Min. Travel Time= 0.3 min
Avg. Velocity = 1.7 fps, Avg. Travel Time= 0.6 min

Peak Storage= 1,493 cf @ 13.23 hrs
Average Depth at Peak Storage= 2.4'
Bank-Full Depth= 2.0' Flow Area= 18.0 sf, Capacity= 66.5 cfs

3.00' x 2.00' deep channel, n= 0.078 Riprap, 12-inch
Side Slope Z-value= 3.0 '/' Top Width= 15.00'
Length= 64.0' Slope= 0.0313 '/'
Inlet Invert= 681.00', Outlet Invert= 679.00'

‡

Summary for Reach 23R: Crops

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 3.56" for 100-Year event
Inflow = 29.8 cfs @ 12.22 hrs, Volume= 2.1 af
Outflow = 24.9 cfs @ 12.42 hrs, Volume= 2.1 af, Atten= 16%, Lag= 11.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.3 fps, Min. Travel Time= 5.5 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 20.3 min

Peak Storage= 8,310 cf @ 12.33 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,304.4 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 752.0' Slope= 0.0616 '/'
Inlet Invert= 727.80', Outlet Invert= 681.50'

‡

Summary for Reach 23R-G: Grass

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 2.69" for 100-Year event
Inflow = 17.1 cfs @ 12.10 hrs, Volume= 1.1 af
Outflow = 16.5 cfs @ 12.13 hrs, Volume= 1.1 af, Atten= 3%, Lag= 2.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.6 fps, Min. Travel Time= 1.1 min
Avg. Velocity = 0.7 fps, Avg. Travel Time= 4.2 min

Peak Storage= 1,163 cf @ 12.11 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 733.8 cfs

40.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 182.0' Slope= 0.0665 '/'
Inlet Invert= 681.50', Outlet Invert= 669.40'

‡

Summary for Reach 23R-S: Swale

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 2.69" for 100-Year event
Inflow = 18.2 cfs @ 12.05 hrs, Volume= 1.1 af
Outflow = 17.4 cfs @ 12.08 hrs, Volume= 1.1 af, Atten= 5%, Lag= 2.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 1.2 min
Avg. Velocity = 1.4 fps, Avg. Travel Time= 3.3 min

Peak Storage= 1,239 cf @ 12.06 hrs
Average Depth at Peak Storage= 1.3'
Bank-Full Depth= 1.0' Flow Area= 3.0 sf, Capacity= 10.5 cfs

1.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 5.00'
Length= 270.0' Slope= 0.0585 '/'
Inlet Invert= 705.50', Outlet Invert= 689.70'

Summary for Reach 24R:

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth = 3.77" for 100-Year event
Inflow = 107.4 cfs @ 12.39 hrs, Volume= 13.8 af
Outflow = 100.9 cfs @ 12.67 hrs, Volume= 13.8 af, Atten= 6%, Lag= 17.0 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.8 fps, Min. Travel Time= 9.7 min
Avg. Velocity = 1.1 fps, Avg. Travel Time= 33.8 min

Peak Storage= 58,739 cf @ 12.51 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,322.5 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass (cultivated farm land)
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 2,220.0' Slope= 0.0633 '/'
Inlet Invert= 822.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-G: Crops

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 3.76" for 100-Year event
Inflow = 90.4 cfs @ 13.06 hrs, Volume= 13.8 af
Outflow = 88.8 cfs @ 13.24 hrs, Volume= 13.8 af, Atten= 2%, Lag= 10.4 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.9 fps, Min. Travel Time= 6.0 min
Avg. Velocity = 1.2 fps, Avg. Travel Time= 19.5 min

Peak Storage= 32,130 cf @ 13.14 hrs
Average Depth at Peak Storage= 0.2'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 1,444.6 cfs

100.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 1,397.0' Slope= 0.0755 '/'
Inlet Invert= 787.00', Outlet Invert= 681.50'

‡

Summary for Reach 24R-W: Woods

Inflow Area = 44.0 ac, 0.05% Impervious, Inflow Depth > 3.76" for 100-Year event
Inflow = 100.9 cfs @ 12.67 hrs, Volume= 13.8 af
Outflow = 90.4 cfs @ 13.06 hrs, Volume= 13.8 af, Atten= 10%, Lag= 23.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.6 fps, Min. Travel Time= 13.2 min
Avg. Velocity = 0.2 fps, Avg. Travel Time= 40.7 min

Peak Storage= 71,470 cf @ 12.84 hrs
Average Depth at Peak Storage= 1.0'
Bank-Full Depth= 1.0' Flow Area= 150.0 sf, Capacity= 91.5 cfs

100.00' x 1.00' deep channel, n= 0.400 Sheet flow: Woods+light brush
Side Slope Z-value= 50.0 '/' Top Width= 200.00'
Length= 480.0' Slope= 0.0396 '/'
Inlet Invert= 806.00', Outlet Invert= 787.00'

‡

Summary for Reach 25RG: Grass

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 2.32" for 100-Year event
Inflow = 13.7 cfs @ 12.14 hrs, Volume= 1.0 af
Outflow = 12.0 cfs @ 12.33 hrs, Volume= 1.0 af, Atten= 13%, Lag= 11.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.1 fps, Min. Travel Time= 6.6 min
Avg. Velocity = 0.6 fps, Avg. Travel Time= 21.9 min

Peak Storage= 4,815 cf @ 12.22 hrs
Average Depth at Peak Storage= 0.1'
Bank-Full Depth= 1.0' Flow Area= 100.0 sf, Capacity= 786.7 cfs

50.00' x 1.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 50.0 '/' Top Width= 150.00'
Length= 848.0' Slope= 0.0590 '/'
Inlet Invert= 725.00', Outlet Invert= 675.00'

‡

Summary for Reach 25RS: Swale

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 2.32" for 100-Year event
Inflow = 14.0 cfs @ 12.12 hrs, Volume= 1.0 af
Outflow = 13.7 cfs @ 12.14 hrs, Volume= 1.0 af, Atten= 2%, Lag= 0.7 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 2.8 fps, Min. Travel Time= 0.5 min
Avg. Velocity = 0.9 fps, Avg. Travel Time= 1.6 min

Peak Storage= 432 cf @ 12.12 hrs
Average Depth at Peak Storage= 0.8'
Bank-Full Depth= 1.0' Flow Area= 7.0 sf, Capacity= 22.2 cfs

4.00' x 1.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 3.0 '/' Top Width= 10.00'
Length= 85.0' Slope= 0.0365 '/'
Inlet Invert= 733.00', Outlet Invert= 729.90'

‡

Summary for Reach 26R: (new Reach)

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 2.69" for 100-Year event
Inflow = 17.4 cfs @ 12.08 hrs, Volume= 1.1 af
Outflow = 17.1 cfs @ 12.10 hrs, Volume= 1.1 af, Atten= 2%, Lag= 1.1 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 3.6 fps, Min. Travel Time= 0.7 min
Avg. Velocity = 1.0 fps, Avg. Travel Time= 2.5 min

Peak Storage= 722 cf @ 12.09 hrs
Average Depth at Peak Storage= 0.8'
Bank-Full Depth= 2.0' Flow Area= 16.0 sf, Capacity= 92.5 cfs

4.00' x 2.00' deep channel, n= 0.069 Riprap, 6-inch
Side Slope Z-value= 2.0 '/' Top Width= 12.00'
Length= 151.0' Slope= 0.0543 '/'
Inlet Invert= 689.70', Outlet Invert= 681.50'

Summary for Reach 31R: Grass

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 3.77" for 100-Year event
Inflow = 15.0 cfs @ 12.14 hrs, Volume= 1.1 af
Outflow = 14.5 cfs @ 12.21 hrs, Volume= 1.1 af, Atten= 3%, Lag= 4.3 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 0.4 fps, Min. Travel Time= 2.3 min
Avg. Velocity = 0.1 fps, Avg. Travel Time= 8.5 min

Peak Storage= 2,008 cf @ 12.17 hrs
Average Depth at Peak Storage= 0.6'
Bank-Full Depth= 1.0' Flow Area= 90.0 sf, Capacity= 44.5 cfs

40.00' x 1.00' deep channel, n= 0.100 Heavy timber, flow below branches
Side Slope Z-value= 50.0 '/' Top Width= 140.00'
Length= 50.0' Slope= 0.0020 '/'
Inlet Invert= 805.50', Outlet Invert= 805.40'

‡

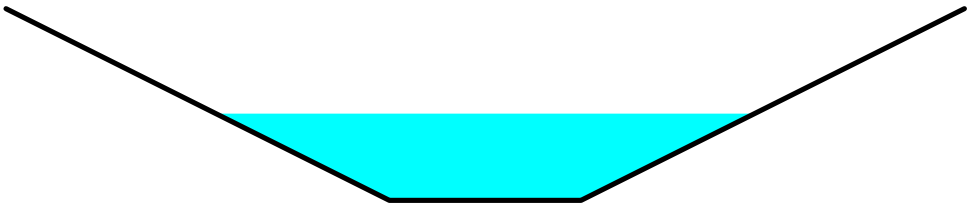
Summary for Reach 40R: Route 30 Ditch

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 4.50" for 100-Year event
Inflow = 21.5 cfs @ 12.62 hrs, Volume= 3.4 af
Outflow = 21.5 cfs @ 12.63 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.5 min

Routing by Stor-Ind+Trans method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Max. Velocity= 6.2 fps, Min. Travel Time= 0.4 min
Avg. Velocity = 2.4 fps, Avg. Travel Time= 1.1 min

Peak Storage= 550 cf @ 12.62 hrs
Average Depth at Peak Storage= 0.9'
Bank-Full Depth= 2.0' Flow Area= 12.0 sf, Capacity= 116.0 cfs

2.00' x 2.00' deep channel, n= 0.035 High grass
Side Slope Z-value= 2.0 '/' Top Width= 10.00'
Length= 160.0' Slope= 0.0459 '/'
Inlet Invert= 662.34', Outlet Invert= 655.00'



Summary for Pond 20P: Culvert-2

Inflow Area = 51.0 ac, 0.04% Impervious, Inflow Depth > 3.73" for 100-Year event
Inflow = 92.9 cfs @ 13.22 hrs, Volume= 15.9 af
Outflow = 92.9 cfs @ 13.23 hrs, Volume= 15.8 af, Atten= 0%, Lag= 0.3 min
Primary = 92.9 cfs @ 13.23 hrs, Volume= 15.8 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 685.38' @ 13.23 hrs Surf.Area= 1,594 sf Storage= 1,955 cf

Plug-Flow detention time= 0.7 min calculated for 15.8 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (921.7 - 921.0)

Volume	Invert	Avail.Storage	Storage Description
#1	681.00'	3,164 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
681.00	4	0	0
682.00	67	36	36
683.00	203	135	171
684.00	591	397	568
685.00	1,137	864	1,432
686.00	2,328	1,733	3,164

Device	Routing	Invert	Outlet Devices
#1	Primary	681.50'	**12.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 681.50' / 681.00' S= 0.0143 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	684.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=92.7 cfs @ 13.23 hrs HW=685.38' (Free Discharge)
1=Culvert (Inlet Controls 7.0 cfs @ 8.9 fps)
2=Broad-Crested Rectangular Weir (Weir Controls 85.8 cfs @ 3.1 fps)

Summary for Pond 22P: Culvert-7

Inflow Area = 7.0 ac, 0.00% Impervious, Inflow Depth = 3.36" for 100-Year event
Inflow = 21.5 cfs @ 12.21 hrs, Volume= 1.9 af
Outflow = 29.8 cfs @ 12.22 hrs, Volume= 2.1 af, Atten= 0%, Lag= 0.6 min
Primary = 29.8 cfs @ 12.22 hrs, Volume= 2.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 731.80' @ 12.20 hrs Surf.Area= 3,977 sf Storage= 6,013 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)
Center-of-Mass det. time= (not calculated: outflow precedes inflow)

Volume	Invert	Avail.Storage	Storage Description
#1	728.00'	6,013 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
728.00	457	0	0
729.00	1,190	824	824
730.00	2,606	1,898	2,722
731.00	3,977	3,292	6,013

Device	Routing	Invert	Outlet Devices
#1	Primary	728.20'	**18.0" Round Culvert** L= 35.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 728.20' / 727.80' S= 0.0114 '/' Cc= 0.900 n= 0.012, Flow Area= 1.77 sf
#2	Primary	731.70'	**180.0' long x 4.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 1.80 2.00 2.50 3.00 3.50 4.00 4.50 5.00 5.50 Coef. (English) 2.38 2.54 2.69 2.68 2.67 2.67 2.65 2.66 2.66 2.68 2.72 2.73 2.76 2.79 2.88 3.07 3.32

Primary OutFlow Max=27.6 cfs @ 12.22 hrs HW=731.80' (Free Discharge)
↑—**1=Culvert** (Inlet Controls 14.4 cfs @ 8.1 fps)
└—**2=Broad-Crested Rectangular Weir** (Weir Controls 13.2 cfs @ 0.7 fps)

Summary for Pond 23P: Culvert-3

Inflow Area = 4.7 ac, 0.20% Impervious, Inflow Depth = 2.69" for 100-Year event
Inflow = 18.2 cfs @ 12.04 hrs, Volume= 1.1 af
Outflow = 18.2 cfs @ 12.05 hrs, Volume= 1.1 af, Atten= 0%, Lag= 0.3 min
Primary = 18.2 cfs @ 12.05 hrs, Volume= 1.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 708.39' @ 12.05 hrs Surf.Area= 863 sf Storage= 695 cf

Plug-Flow detention time= 0.7 min calculated for 1.1 af (100% of inflow)
Center-of-Mass det. time= 0.7 min (846.3 - 845.6)

Volume	Invert	Avail.Storage	Storage Description
#1	706.00'	3,590 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
706.00	23	0	0
707.00	120	72	72
708.00	571	346	417
709.00	1,324	948	1,365
710.00	3,126	2,225	3,590

Device	Routing	Invert	Outlet Devices
#1	Primary	706.00'	**12.0" Round Culvert** L= 31.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 706.00' / 704.50' S= 0.0484 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	708.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=18.1 cfs @ 12.05 hrs HW=708.38' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.2 cfs @ 6.6 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 12.9 cfs @ 1.7 fps)

Summary for Pond 24P: Culvert-6

Inflow Area = 5.2 ac, 0.27% Impervious, Inflow Depth = 3.77" for 100-Year event
Inflow = 19.5 cfs @ 12.17 hrs, Volume= 1.6 af
Outflow = 19.2 cfs @ 12.20 hrs, Volume= 1.6 af, Atten= 1%, Lag= 1.8 min
Primary = 19.2 cfs @ 12.20 hrs, Volume= 1.6 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 824.39' @ 12.20 hrs Surf.Area= 5,048 sf Storage= 3,355 cf

Plug-Flow detention time= 1.8 min calculated for 1.6 af (100% of inflow)
Center-of-Mass det. time= 1.8 min (832.9 - 831.1)

Volume	Invert	Avail.Storage	Storage Description
#1	823.00'	18,148 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
823.00	493	0	0
824.00	3,067	1,780	1,780
825.00	8,169	5,618	7,398
826.00	13,330	10,750	18,148

Device	Routing	Invert	Outlet Devices
#1	Primary	821.00'	**12.0" Round Culvert** L= 57.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 821.00' / 820.50' S= 0.0088 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	824.00'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=19.2 cfs @ 12.20 hrs HW=824.39' (Free Discharge)
└**1=Culvert** (Barrel Controls 6.2 cfs @ 7.8 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 13.0 cfs @ 1.7 fps)

Summary for Pond 25P: Culvert-4

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 2.32" for 100-Year event
Inflow = 14.1 cfs @ 12.12 hrs, Volume= 1.0 af
Outflow = 14.0 cfs @ 12.12 hrs, Volume= 1.0 af, Atten= 1%, Lag= 0.3 min
Primary = 14.0 cfs @ 12.12 hrs, Volume= 1.0 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 736.77' @ 12.12 hrs Surf.Area= 851 sf Storage= 849 cf

Plug-Flow detention time= 3.5 min calculated for 1.0 af (100% of inflow)
Center-of-Mass det. time= 1.1 min (862.4 - 861.3)

Volume	Invert	Avail.Storage	Storage Description
#1	734.00'	7,832 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
734.00	38	0	0
735.00	131	85	85
736.00	417	274	359
737.00	978	698	1,056
738.00	1,789	1,384	2,440
739.00	2,699	2,244	4,684
740.00	3,598	3,149	7,832

Device	Routing	Invert	Outlet Devices
#1	Primary	733.50'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 733.50' / 733.00' S= 0.0200 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	736.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=13.7 cfs @ 12.12 hrs HW=736.77' (Free Discharge)
└**1=Culvert** (Inlet Controls 6.3 cfs @ 8.0 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 7.4 cfs @ 1.4 fps)

Summary for Pond 26P: Depression

Inflow Area = 5.4 ac, 0.00% Impervious, Inflow Depth = 2.32" for 100-Year event
Inflow = 13.7 cfs @ 12.14 hrs, Volume= 1.0 af
Outflow = 13.7 cfs @ 12.14 hrs, Volume= 1.0 af, Atten= 0%, Lag= 0.0 min
Primary = 13.7 cfs @ 12.14 hrs, Volume= 1.0 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs / 2
Peak Elev= 722.14' @ 12.14 hrs Surf.Area= 234 sf Storage= 30 cf

Plug-Flow detention time= (not calculated: outflow precedes inflow)

Center-of-Mass det. time= 0.0 min (864.0 - 864.0)

Volume	Invert	Avail.Storage	Storage Description
#1	722.00'	2,084 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
722.00	187	0	0
723.00	515	351	351
724.00	850	683	1,034
725.00	1,250	1,050	2,084

Device	Routing	Invert	Outlet Devices
#1	Primary	722.00'	**100.0' long x 10.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.49 2.56 2.70 2.69 2.68 2.69 2.67 2.64

Primary OutFlow Max=13.6 cfs @ 12.14 hrs HW=722.14' (Free Discharge)
↑—**1=Broad-Crested Rectangular Weir** (Weir Controls 13.6 cfs @ 0.9 fps)

Summary for Pond 31P: Culvert-5

Inflow Area = 3.5 ac, 0.00% Impervious, Inflow Depth = 3.77" for 100-Year event
Inflow = 15.6 cfs @ 12.10 hrs, Volume= 1.1 af
Outflow = 15.0 cfs @ 12.14 hrs, Volume= 1.1 af, Atten= 4%, Lag= 2.5 min
Primary = 15.0 cfs @ 12.14 hrs, Volume= 1.1 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 808.81' @ 12.14 hrs Surf.Area= 6,152 sf Storage= 3,352 cf

Plug-Flow detention time= 3.5 min calculated for 1.1 af (100% of inflow)
Center-of-Mass det. time= 3.3 min (828.6 - 825.3)

Volume	Invert	Avail.Storage	Storage Description
#1	806.00'	19,462 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
806.00	184	0	0
807.00	306	245	245
808.00	517	412	657
809.00	7,488	4,003	4,659
810.00	22,117	14,803	19,462

Device	Routing	Invert	Outlet Devices
#1	Primary	806.00'	**12.0" Round Culvert** L= 25.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 806.00' / 805.70' S= 0.0120 '/' Cc= 0.900 n= 0.012 Corrugated PP, smooth interior, Flow Area= 0.79 sf
#2	Primary	808.50'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir**

Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60
Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=14.8 cfs @ 12.14 hrs HW=808.80' (Free Discharge)
└**1=Culvert** (Inlet Controls 5.7 cfs @ 7.3 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 9.1 cfs @ 1.5 fps)

Summary for Pond 40P: Culvert-1 [Route 30]

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 4.50" for 100-Year event
Inflow = 21.5 cfs @ 12.62 hrs, Volume= 3.4 af
Outflow = 21.5 cfs @ 12.62 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.2 min
Primary = 21.5 cfs @ 12.62 hrs, Volume= 3.4 af

Routing by Stor-Ind method, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs
Peak Elev= 665.75' @ 12.62 hrs Surf.Area= 782 sf Storage= 389 cf

Plug-Flow detention time= 0.2 min calculated for 3.4 af (100% of inflow)
Center-of-Mass det. time= 0.2 min (846.8 - 846.6)

Volume	Invert	Avail.Storage	Storage Description
#1	663.50'	6,466 cf	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (sq-ft)	Inc.Store (cubic-feet)	Cum.Store (cubic-feet)
663.50	5	0	0
664.00	13	5	5
665.00	94	54	58
666.00	1,006	550	608
667.00	2,797	1,902	2,510
668.00	5,115	3,956	6,466

Device	Routing	Invert	Outlet Devices
#1	Primary	663.10'	**12.0" Round Culvert** L= 95.0' CPP, end-section conforming to fill, Ke= 0.500 Inlet / Outlet Invert= 663.10' / 662.30' S= 0.0084 '/' Cc= 0.900 n= 0.012, Flow Area= 0.79 sf
#2	Primary	665.30'	**20.0' long x 20.0' breadth Broad-Crested Rectangular Weir** Head (feet) 0.20 0.40 0.60 0.80 1.00 1.20 1.40 1.60 Coef. (English) 2.68 2.70 2.70 2.64 2.63 2.64 2.64 2.63

Primary OutFlow Max=21.4 cfs @ 12.62 hrs HW=665.75' (Free Discharge)
└**1=Culvert** (Barrel Controls 4.9 cfs @ 6.3 fps)
└**2=Broad-Crested Rectangular Weir** (Weir Controls 16.5 cfs @ 1.8 fps)

Summary for Link POA 1: SOUTHEAST

Inflow Area = 24.6 ac, 0.00% Impervious, Inflow Depth = 3.17" for 100-Year event
Inflow = 83.8 cfs @ 12.14 hrs, Volume= 6.5 af
Primary = 83.8 cfs @ 12.14 hrs, Volume= 6.5 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 2: WEST

Inflow Area = 84.1 ac, 0.04% Impervious, Inflow Depth > 3.70" for 100-Year event
Inflow = 139.3 cfs @ 12.11 hrs, Volume= 26.0 af
Primary = 139.3 cfs @ 12.11 hrs, Volume= 26.0 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA 3: NORTH

Inflow Area = 12.5 ac, 0.00% Impervious, Inflow Depth = 3.69" for 100-Year event
Inflow = 45.9 cfs @ 12.20 hrs, Volume= 3.8 af
Primary = 45.9 cfs @ 12.20 hrs, Volume= 3.8 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

Summary for Link POA-4: ROUTE 30

Inflow Area = 9.0 ac, 0.00% Impervious, Inflow Depth = 4.50" for 100-Year event
Inflow = 21.5 cfs @ 12.63 hrs, Volume= 3.4 af
Primary = 21.5 cfs @ 12.63 hrs, Volume= 3.4 af, Atten= 0%, Lag= 0.0 min

Primary outflow = Inflow, Time Span= 5.00-30.00 hrs, dt= 0.05 hrs

APPENDIX B

Swale and Culvert Calculations

Borrego Solar Systems, Inc.	Project:	117 Bliss Road Schoharie NY	
55 Technology Drive, Suite 102	Subject:	Swale Calculations	
Lowell, MA 01851	Designed B	DMA	Date: 9/4/2019
	Checked By	DMA	Date: 9/5/2019

Purpose:

To evaluate the capacity and velocity of each of the swales proposed for the project. The rational metho Q = CIA is used to determine the flow rate (in cubic feet per second) based on the Area (A), CCoefficent (of the surface type, and the Intensity (I) for a specifc duration and storm frequency. The inputs and the calculations are entered into Hydraflow to determine rate of runoff (cfs) and velocity, amongst other val

Inputs:

Using B type soils and a slope of > 6% on average the following C values are used.

Forest	0.18	
Meadow	0.37	
Pasture	0.45	
Farmland	0.28	
Gravel road	0.85	
Disturbed areas	0.7	
Brush	0.25	
Solar	0.37	same as meadow

Storm Event is 10 yr storm at 60 minutes duration = 1.55 inches/hour
This is based on Future Projections for a Changing Climate developed by Cornell University

N- coefficents for swales

Rock lined (6") =	0.069
Cobble bottom veg sides =	0.033

Swale #1

240000

A		C	I	CIA	
11900	gravel road	0.85	1.55	0.4	cfs
222100	Farmland	0.28	1.55	2.2	cfs
6000	Forest	0.18	1.55	0.0	cfs
5.51			Total Swale	2.6	cfs

Top of Swale	685.0
Bottom of Swale	663.2
Length of Swale (lf)	600
Slope of Swale	3.6%

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851

Project: 117 Bliss Road Schoharie NY
Subject: Swale Calculations
Designed By: DMA Date: 9/4/2019
Checked By: DMA Date: 9/5/2019

Swale #2

1250000

A		C	I	CIA	
2620	gravel road	0.85	1.55	0.1	cfs
264000	solar	0.37	1.55	3.5	cfs
654380	Farmland	0.28	1.55	6.5	cfs
329000	Forest	0.18	1.55	2.1	cfs
28.70			Total Swale	12.2	cfs

Top of Swale	685.0
Bottom of Swale	681.5
Length of Swale (lf)	131
Slope of Swale	2.7%

Swale #3 113800 2.612489

A		C	I	CIA	
3600	gravel road	0.85	1.55	0.1	cfs
14500	solar	0.37	1.55	0.2	cfs
77700	Farmland	0.28	1.55	0.8	cfs
18000	Forest	0.18	1.55	0.1	cfs
2.61			Total Swale	1.2	cfs

Top of Swale	689.0
Bottom of Swale	681.5
Length of Swale (lf)	180
Slope of Swale	4.2%

Swale #4 26700 0.612948

A		C	I	CIA	
6900	gravel road	0.85	1.55	0.2	cfs
12600	solar	0.37	1.55	0.2	cfs
7200	Farmland	0.28	1.55	0.1	cfs
0	Forest	0.18	1.55	0.0	cfs
0.61			Sub Total	0.4	cfs
			Total	3.2	

Top of Swale	704.5
Bottom of Swale	690.0
Length of Swale (lf)	279
Slope of Swale	5.2%

Swales 5 and 6 discharge into swale 4

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851

Project: 117 Bliss Road Schoharie NY
Subject: Swale Calculations
Designed By: DMA Date: 9/4/2019
Checked By: DMA Date: 9/5/2019

Swale #5 173100 3.973829

A		C	I	CIA	
8000	gravel road	0.85	1.55	0.2	cfs
143000	solar	0.37	1.55	1.9	cfs
22100	Farmland	0.28	1.55	0.2	cfs
0	Forest	0.18	1.55	0.0	cfs
3.97			Total Swale	2.3	cfs

Top of Swale	709.4
Bottom of Swale	705
Length of Swale (lf)	365
Slope of Swale	1.2%

Swale #6 21400 0.491276

A		C	I	CIA	
6120	gravel road	0.85	1.55	0.2	cfs
6900	solar	0.37	1.55	0.1	cfs
8380	Farmland	0.28	1.55	0.1	cfs
0	Forest	0.18	1.55	0.0	cfs
0.49			Total Swale	0.4	cfs

Top of Swale	734.0
Bottom of Swale	706.0
Length of Swale (lf)	279
Slope of Swale	10.0%

Swale #7 285000 6.5427

A		C	I	CIA	
11300	gravel road	0.85	1.55	0.3	cfs
23500	solar	0.37	1.55	0.3	cfs
91100	Farmland	0.28	1.55	0.9	cfs
159100	Forest	0.18	1.55	1.0	cfs
6.54			Total Swale	2.6	cfs

Top of Swale	739.7
Bottom of Swale	729.0
Length of Swale (lf)	565
Slope of Swale	1.9%

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851

Project: 117 Bliss Road Schoharie NY
Subject: Swale Calculations
Designed By: DMA Date: 9/4/2019
Checked By: DMA Date: 9/5/2019

Swale #8 92200 2.116621

A		C	I	CIA	
5480	gravel road	0.85	1.55	0.2	cfs
0	solar	0.37	1.55	0.0	cfs
24420	Farmland	0.28	1.55	0.2	cfs
62300	Forest	0.18	1.55	0.4	cfs
2.12			Total Swale	0.8	cfs

Top of Swale	739.7
Bottom of Swale	733.5
Length of Swale (lf)	274
Slope of Swale	2.3%

Swale #9 143600 3.296602

A		C	I	CIA	
15240	gravel road	0.85	1.55	0.5	cfs
15700	solar	0.37	1.55	0.2	cfs
31260	Farmland	0.28	1.55	0.3	cfs
81400	Forest	0.18	1.55	0.5	cfs
3.30			Total Swale	1.5	cfs

Top of Swale	810.0
Bottom of Swale	733.5
Length of Swale (lf)	800
Slope of Swale	9.6%

Swale #10 227500 5.222681

A		C	I	CIA	
15240	gravel road	0.85	1.55	0.5	cfs
15700	solar	0.37	1.55	0.2	cfs
115160	Farmland	0.28	1.55	1.1	cfs
81400	Forest	0.18	1.55	0.5	cfs
5.22			Total Swale	2.3	cfs

Top of Swale	821.8
Bottom of Swale	809.0
Length of Swale (lf)	400
Slope of Swale	3.2%

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851

Project: 117 Bliss Road Schoharie NY
Subject: Swale Calculations
Designed B DMA Date: 9/4/2019
Checked By DMA Date: 9/5/2019

Swale #11 59700 1.370523

A		C	I	CIA	
14600	gravel road	0.85	1.55	0.4	cfs
40600	solar	0.37	1.55	0.5	cfs
4500	Farmland	0.28	1.55	0.0	cfs
0	Forest	0.18	1.55	0.0	cfs
1.37			Total Swale	1.0	cfs

Top of Swale	874.0
Bottom of Swale	820.0
Length of Swale (lf)	766
Slope of Swale	7.0%

Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #1

Trapezoidal

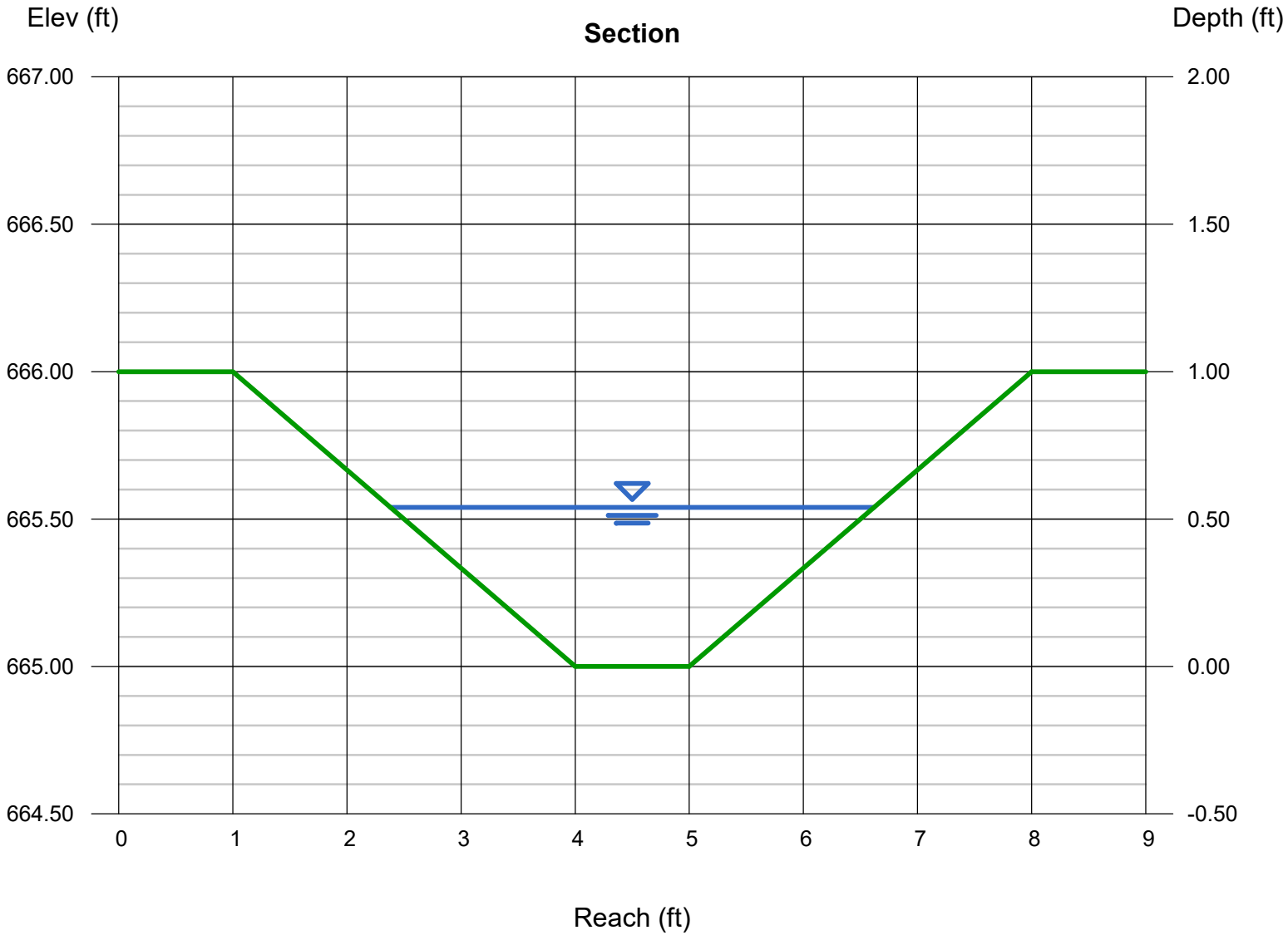
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 665.00
Slope (%)	= 3.60
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.60

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 2.600
Area (sqft)	= 1.41
Velocity (ft/s)	= 1.84
Wetted Perim (ft)	= 4.42
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 4.24
EGL (ft)	= 0.59



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #2

Trapezoidal

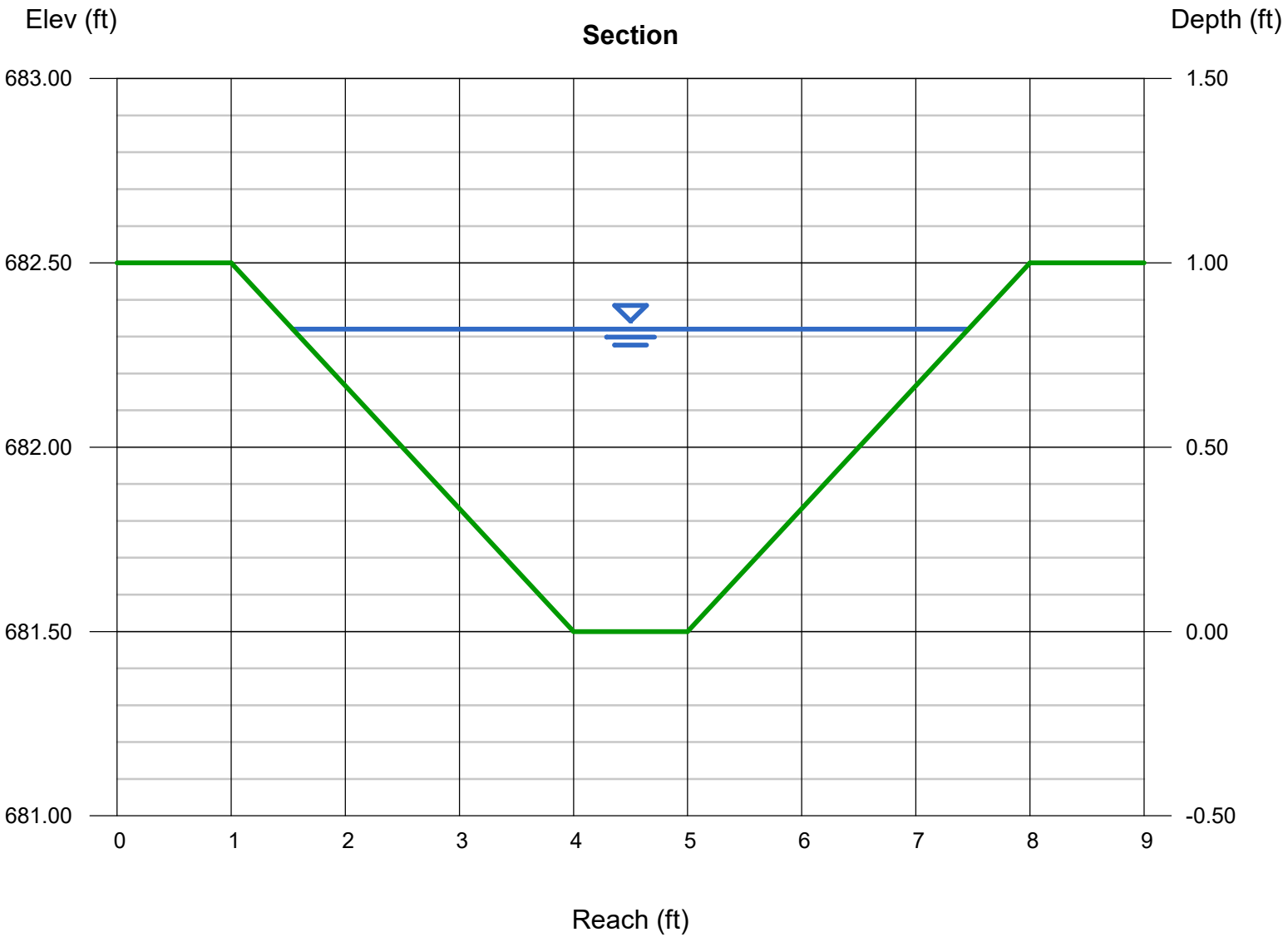
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 681.50
Slope (%)	= 2.70
N-Value	= 0.033

Calculations

Compute by:	Known Q
Known Q (cfs)	= 12.20

Highlighted

Depth (ft)	= 0.82
Q (cfs)	= 12.20
Area (sqft)	= 2.84
Velocity (ft/s)	= 4.30
Wetted Perim (ft)	= 6.19
Crit Depth, Yc (ft)	= 0.86
Top Width (ft)	= 5.92
EGL (ft)	= 1.11



Channel Report

Swale #3

Trapezoidal

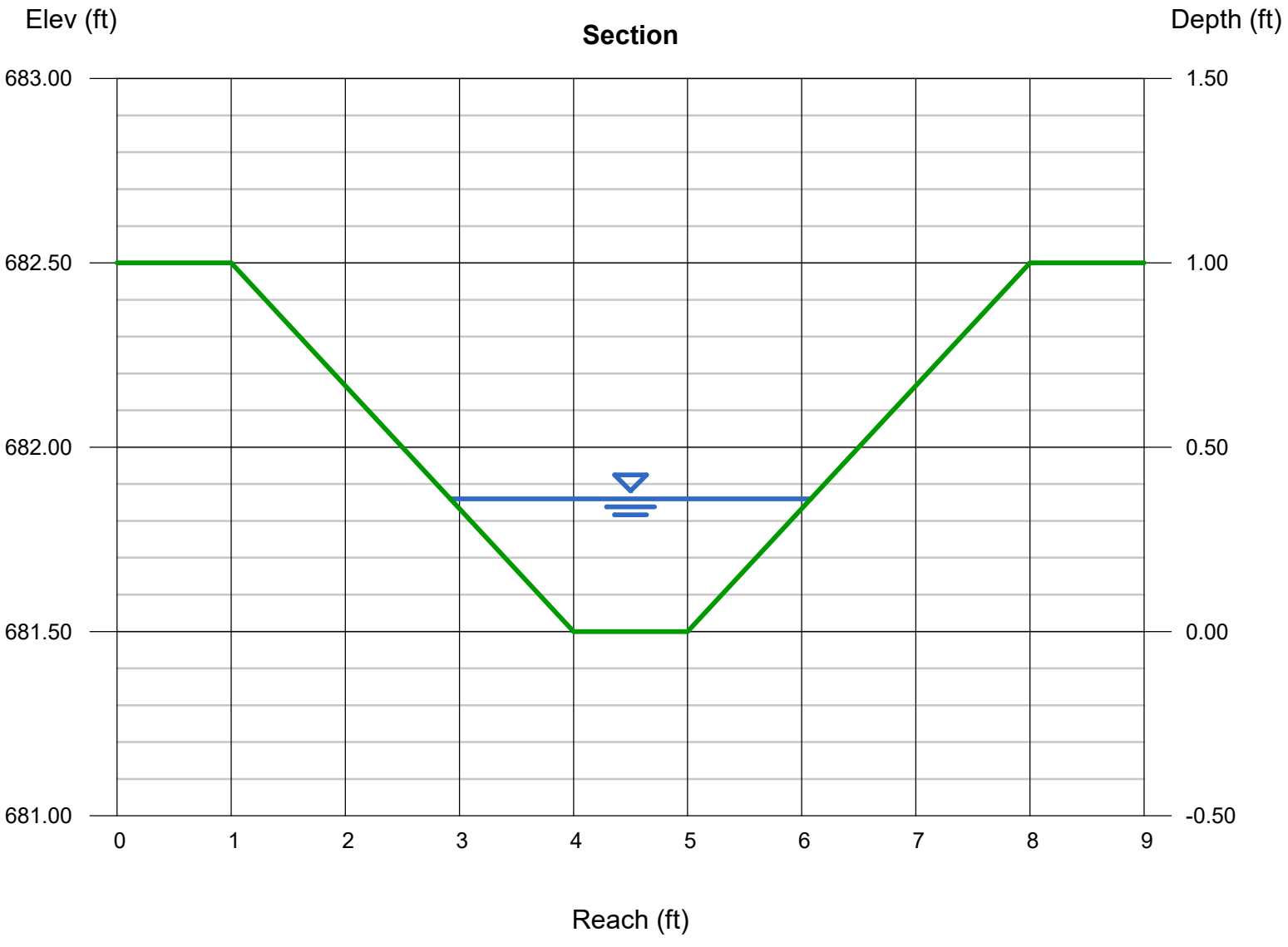
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 681.50
Slope (%)	= 4.20
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.20

Highlighted

Depth (ft)	= 0.36
Q (cfs)	= 1.200
Area (sqft)	= 0.75
Velocity (ft/s)	= 1.60
Wetted Perim (ft)	= 3.28
Crit Depth, Yc (ft)	= 0.28
Top Width (ft)	= 3.16
EGL (ft)	= 0.40



Channel Report

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Swale #4

Trapezoidal

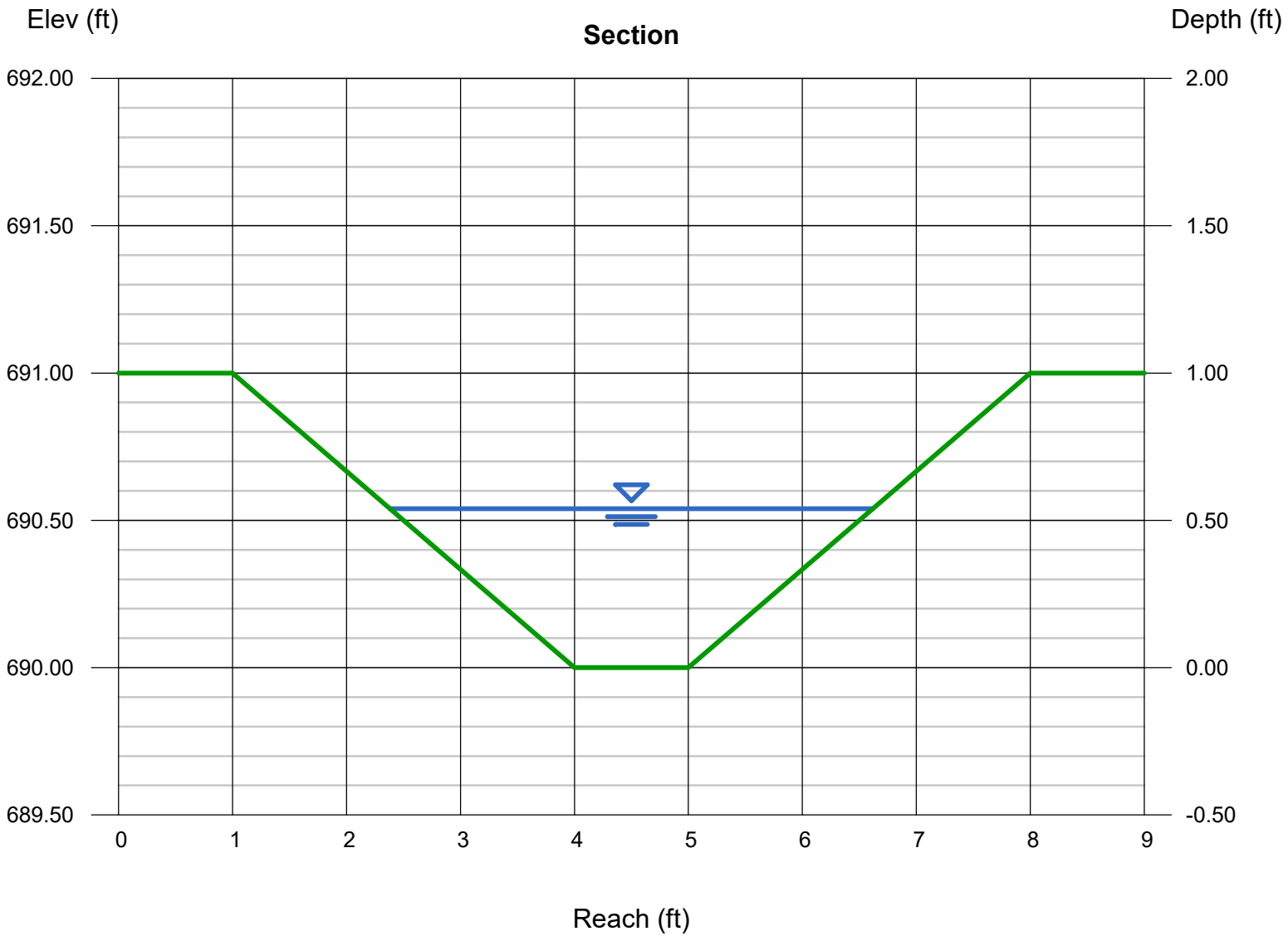
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 690.00
Slope (%)	= 5.20
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 3.20

Highlighted

Depth (ft)	= 0.54
Q (cfs)	= 3.200
Area (sqft)	= 1.41
Velocity (ft/s)	= 2.26
Wetted Perim (ft)	= 4.42
Crit Depth, Yc (ft)	= 0.45
Top Width (ft)	= 4.24
EGL (ft)	= 0.62



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #5

Trapezoidal

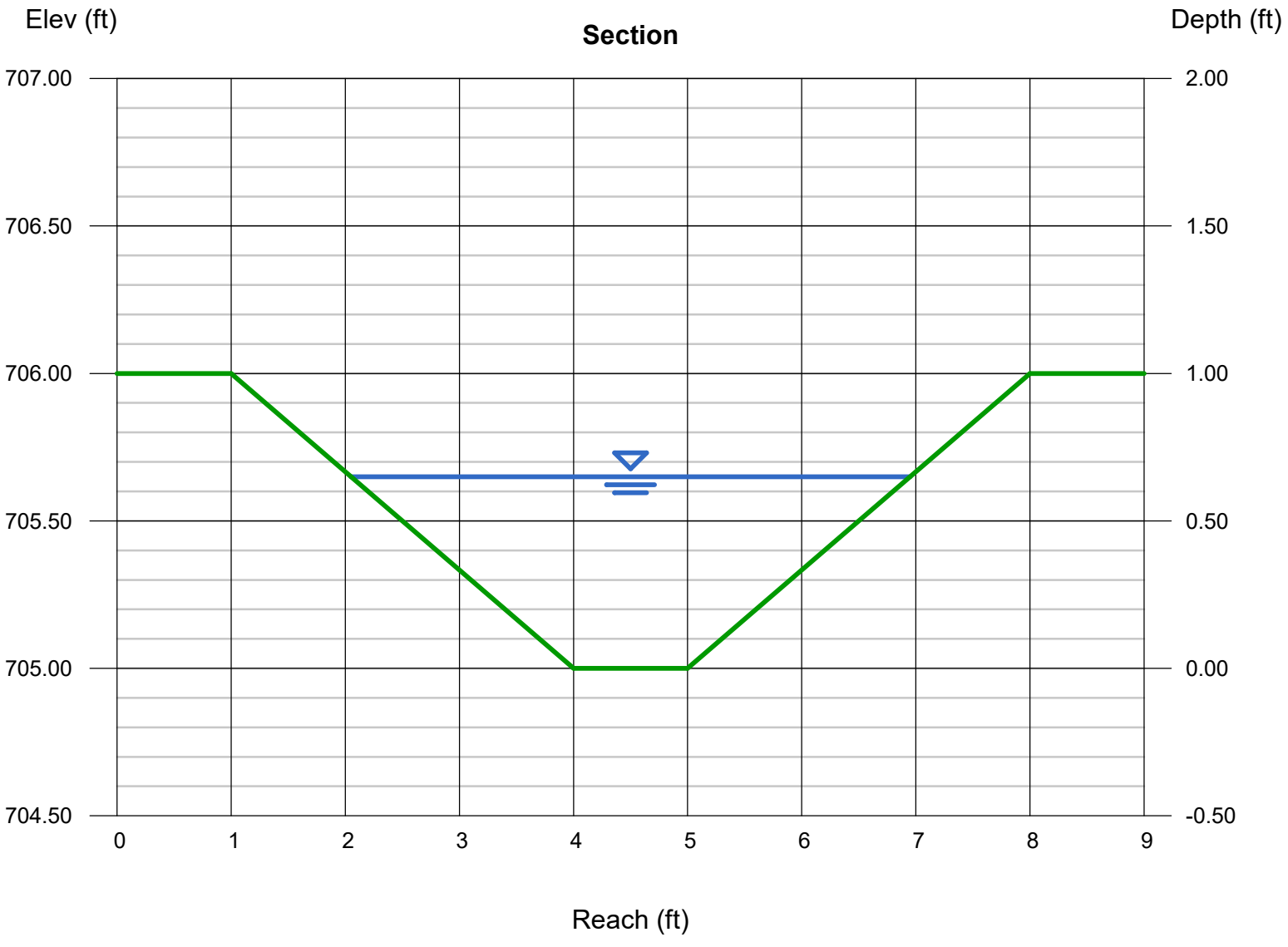
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 705.00
Slope (%)	= 1.20
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.65
Q (cfs)	= 2.300
Area (sqft)	= 1.92
Velocity (ft/s)	= 1.20
Wetted Perim (ft)	= 5.11
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 4.90
EGL (ft)	= 0.67



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #6

Trapezoidal

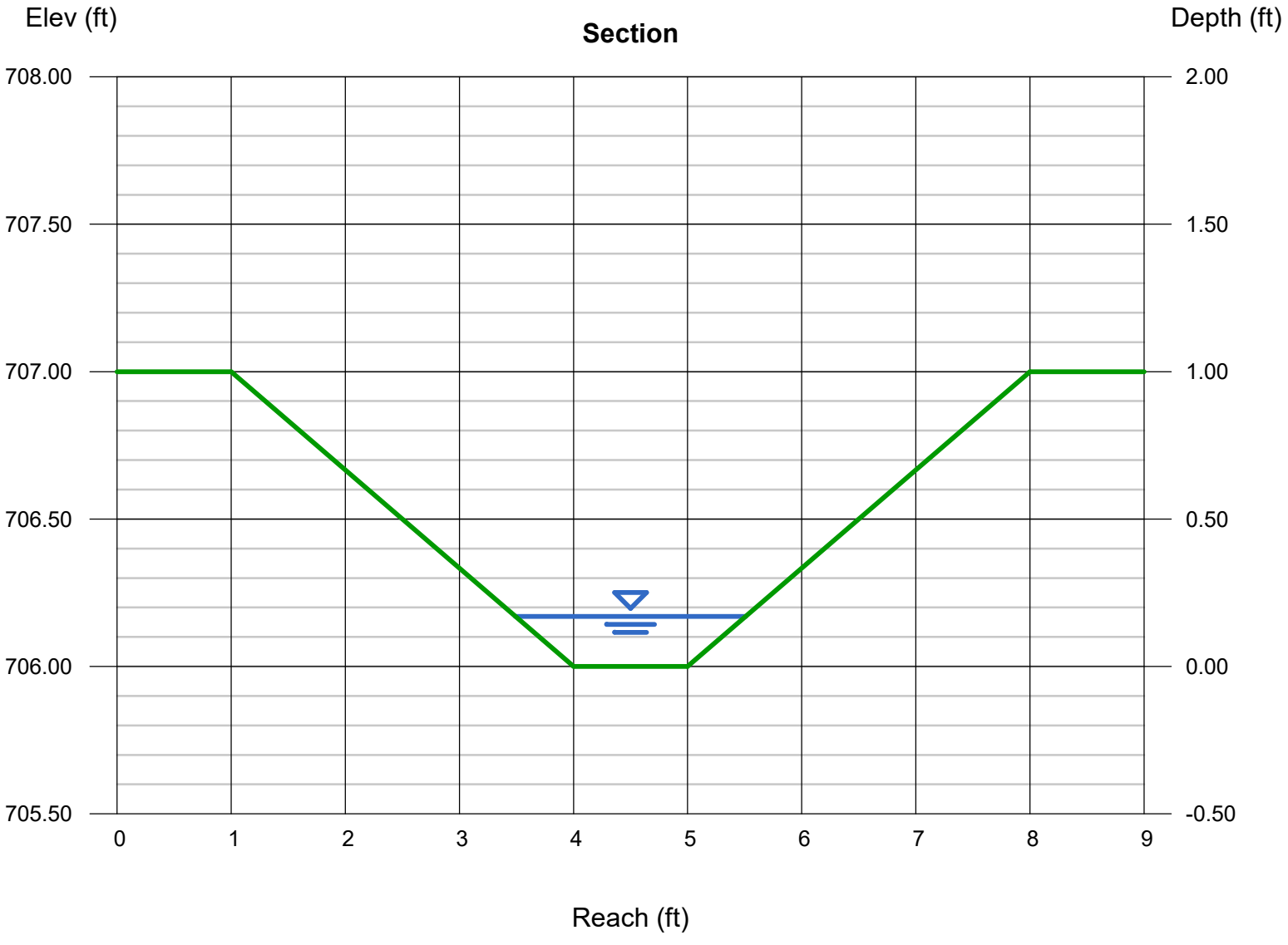
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 706.00
Slope (%)	= 10.00
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.40

Highlighted

Depth (ft)	= 0.17
Q (cfs)	= 0.400
Area (sqft)	= 0.26
Velocity (ft/s)	= 1.56
Wetted Perim (ft)	= 2.08
Crit Depth, Yc (ft)	= 0.15
Top Width (ft)	= 2.02
EGL (ft)	= 0.21



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #7

Trapezoidal

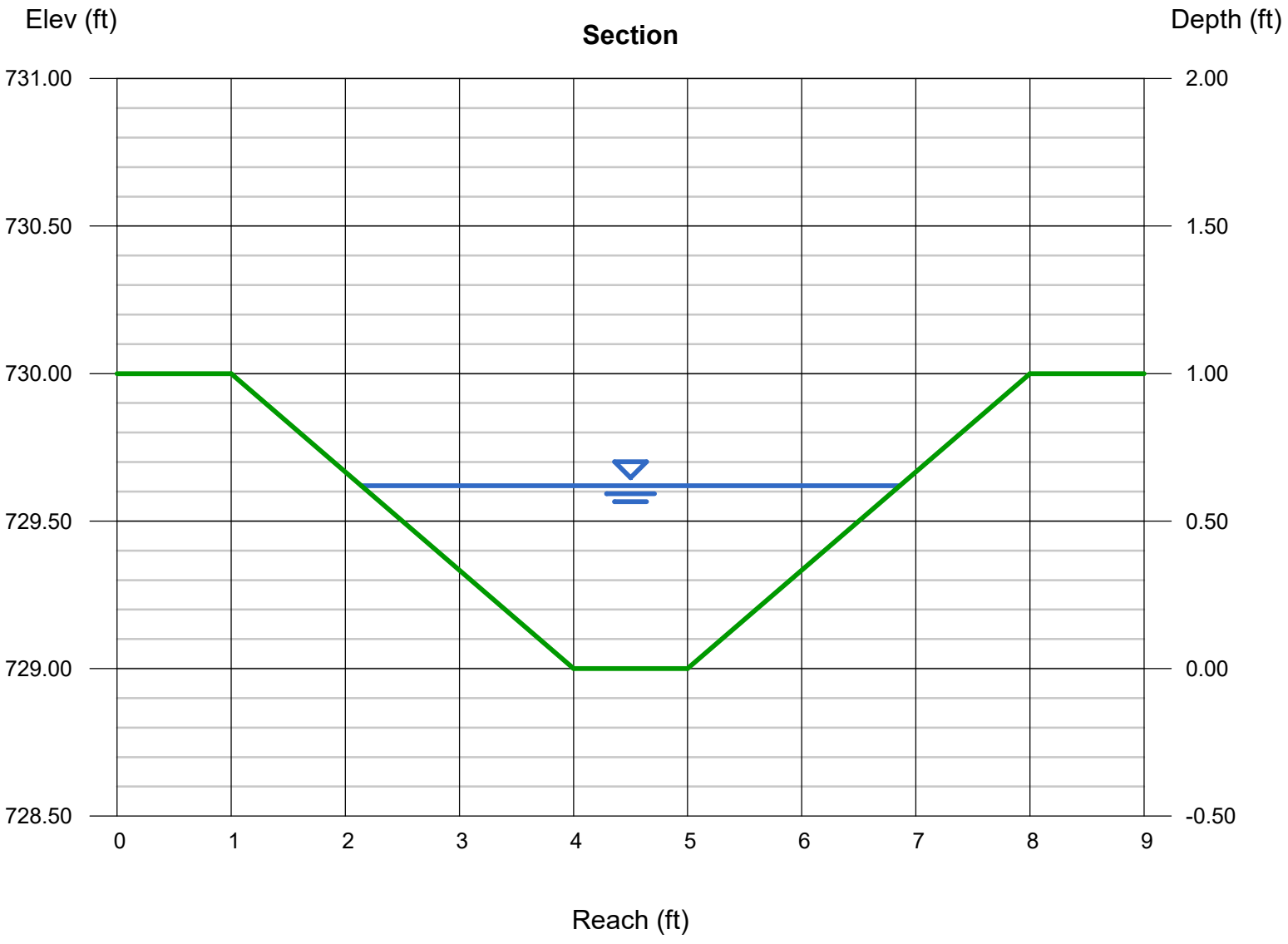
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 729.00
Slope (%)	= 1.90
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.60

Highlighted

Depth (ft)	= 0.62
Q (cfs)	= 2.600
Area (sqft)	= 1.77
Velocity (ft/s)	= 1.47
Wetted Perim (ft)	= 4.92
Crit Depth, Yc (ft)	= 0.41
Top Width (ft)	= 4.72
EGL (ft)	= 0.65



Channel Report

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Swale #8

Trapezoidal

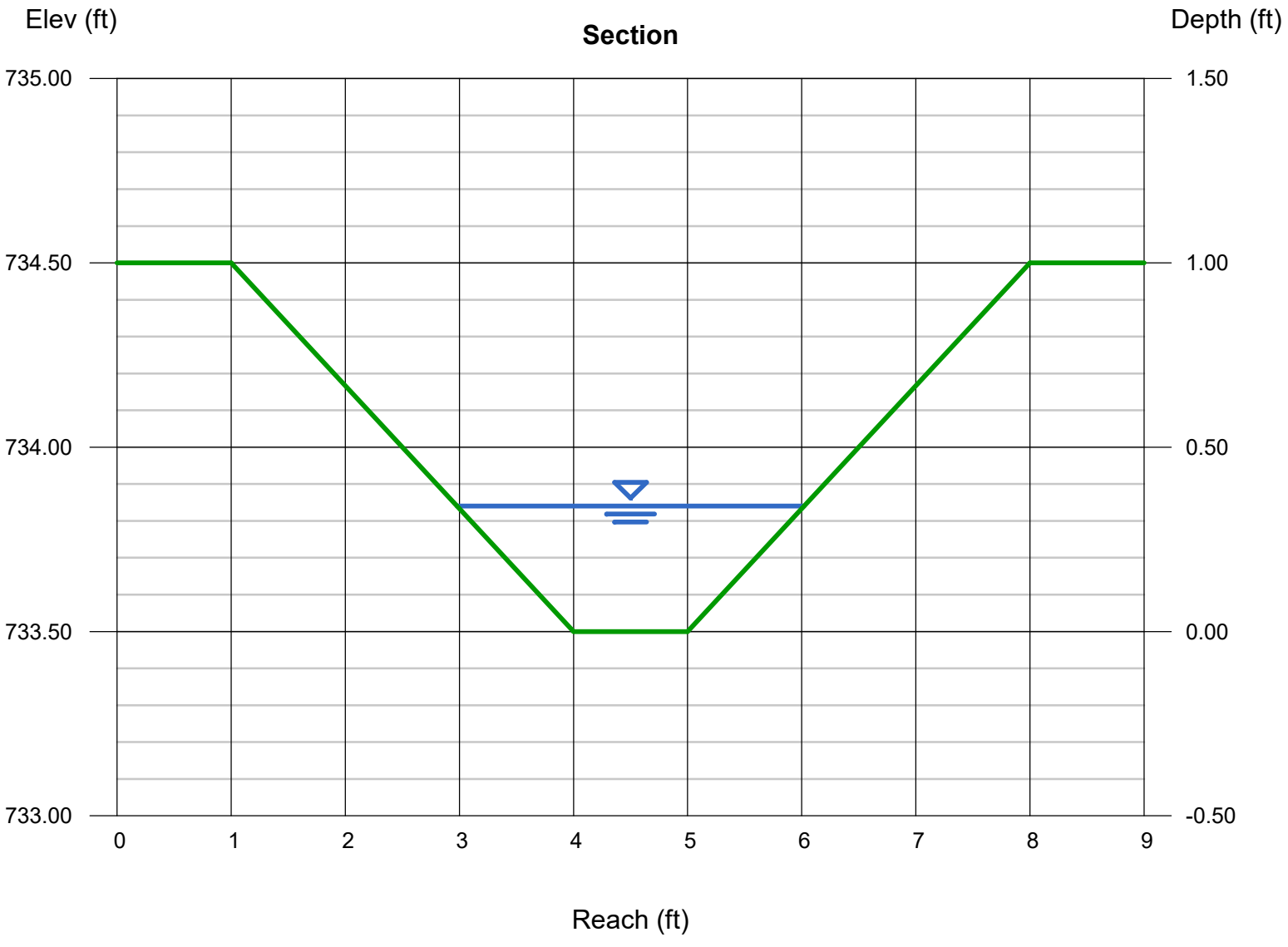
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 733.50
Slope (%)	= 2.30
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 0.80

Highlighted

Depth (ft)	= 0.34
Q (cfs)	= 0.800
Area (sqft)	= 0.69
Velocity (ft/s)	= 1.16
Wetted Perim (ft)	= 3.15
Crit Depth, Yc (ft)	= 0.22
Top Width (ft)	= 3.04
EGL (ft)	= 0.36



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #9

Trapezoidal

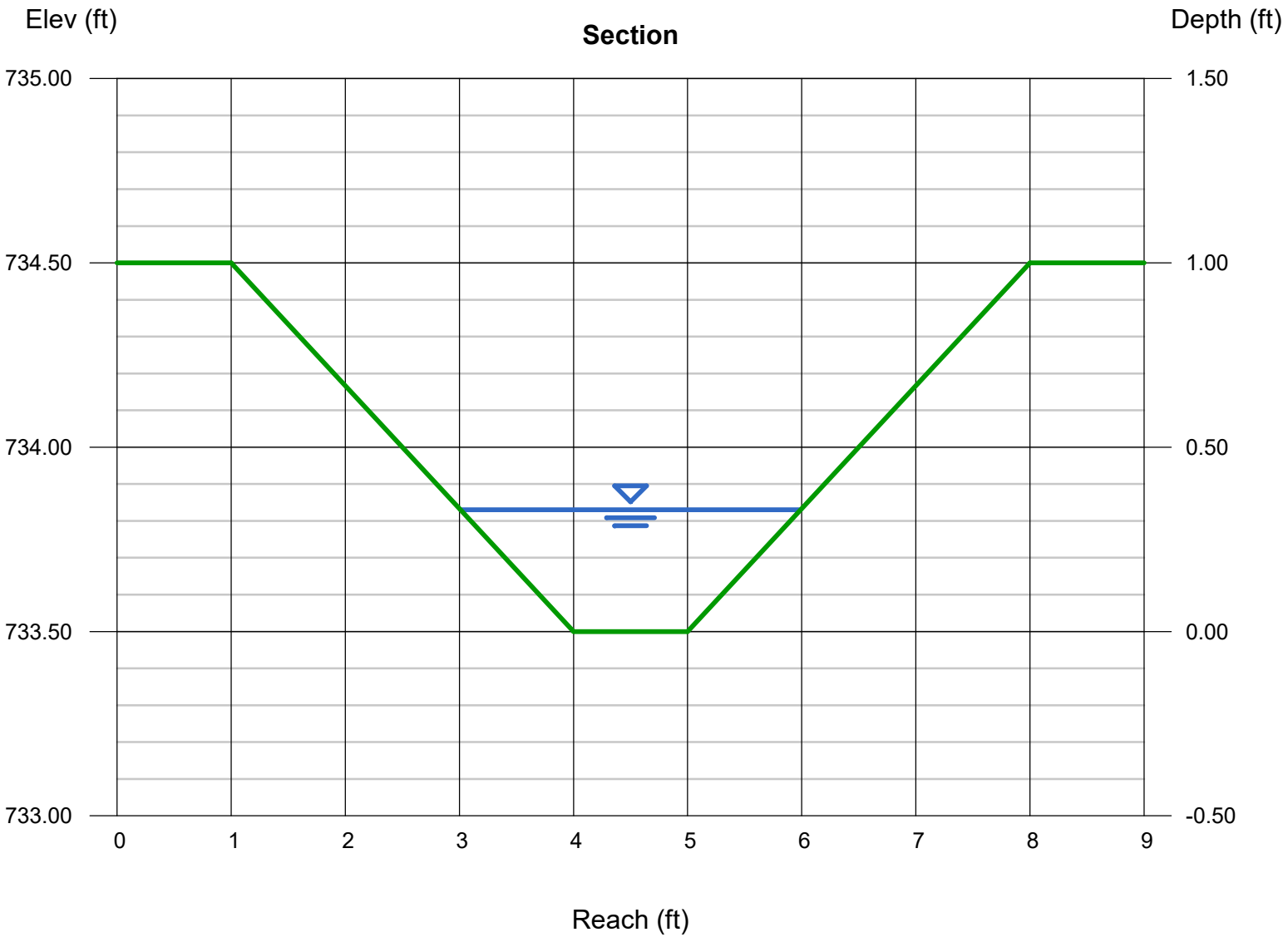
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 733.50
Slope (%)	= 9.60
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.50

Highlighted

Depth (ft)	= 0.33
Q (cfs)	= 1.500
Area (sqft)	= 0.66
Velocity (ft/s)	= 2.28
Wetted Perim (ft)	= 3.09
Crit Depth, Yc (ft)	= 0.31
Top Width (ft)	= 2.98
EGL (ft)	= 0.41



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #10

Trapezoidal

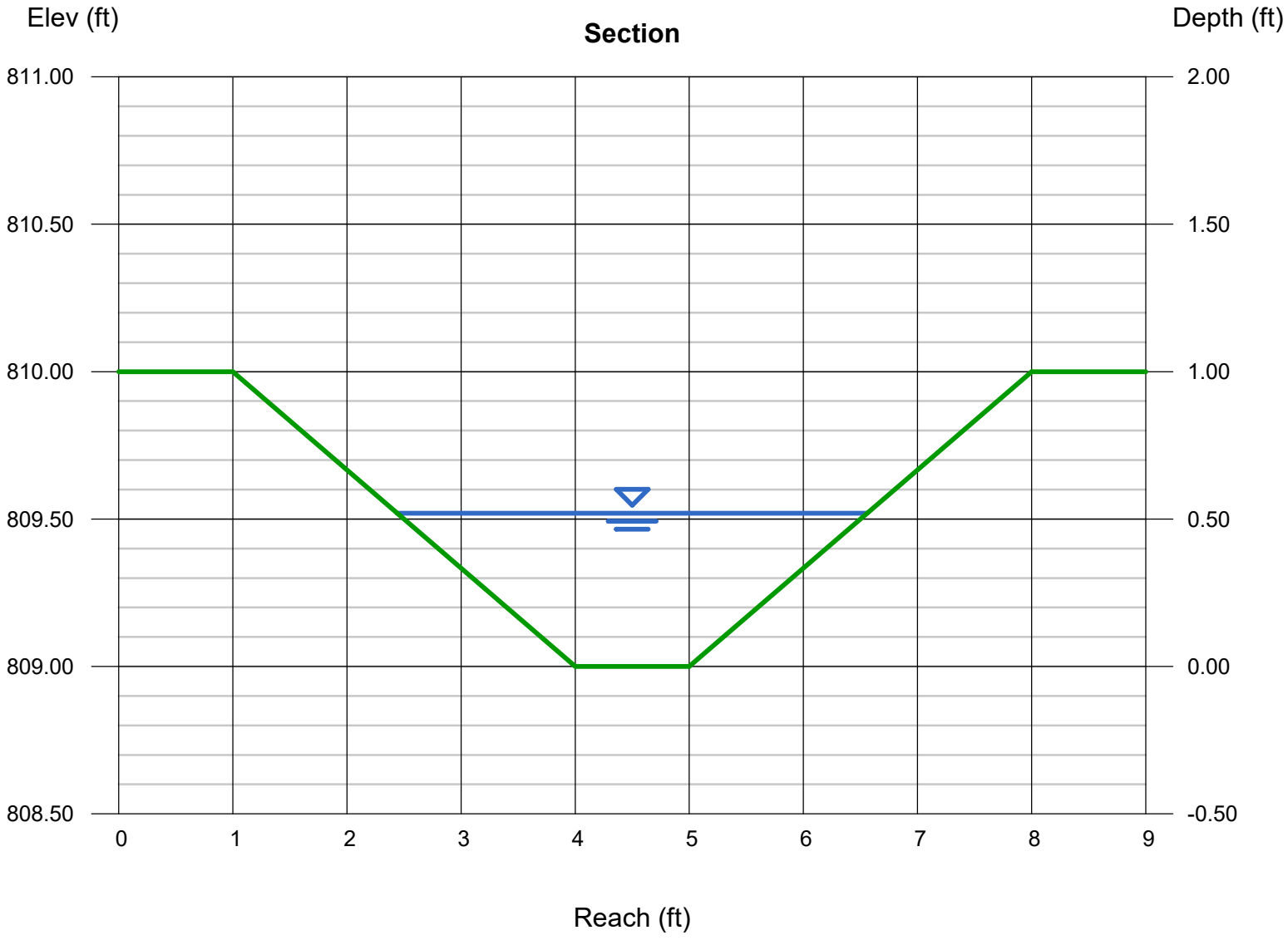
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 809.00
Slope (%)	= 3.20
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 2.30

Highlighted

Depth (ft)	= 0.52
Q (cfs)	= 2.300
Area (sqft)	= 1.33
Velocity (ft/s)	= 1.73
Wetted Perim (ft)	= 4.29
Crit Depth, Yc (ft)	= 0.39
Top Width (ft)	= 4.12
EGL (ft)	= 0.57



Channel Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Swale #11

Trapezoidal

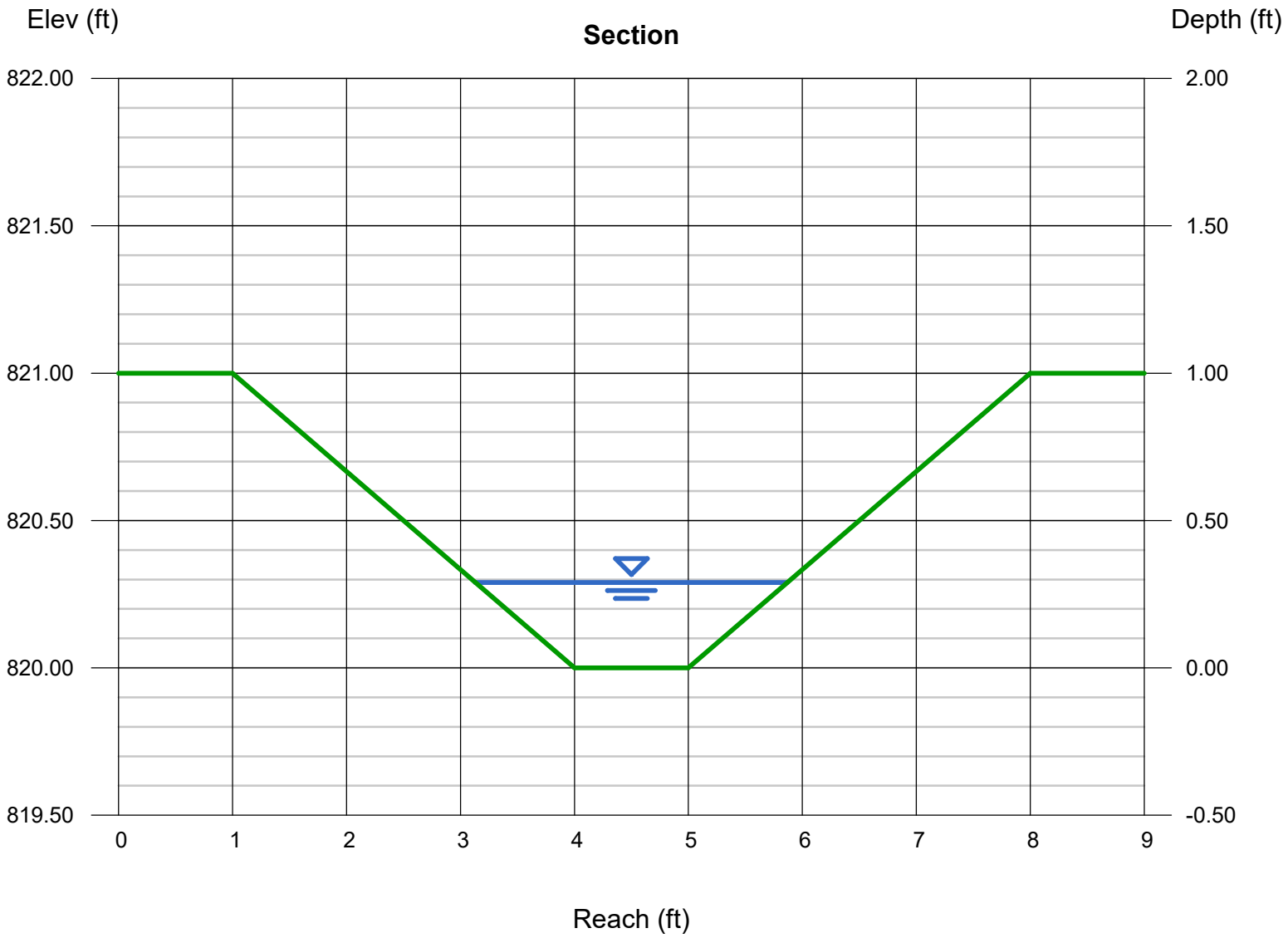
Bottom Width (ft)	= 1.00
Side Slopes (z:1)	= 3.00, 3.00
Total Depth (ft)	= 1.00
Invert Elev (ft)	= 820.00
Slope (%)	= 7.00
N-Value	= 0.069

Calculations

Compute by:	Known Q
Known Q (cfs)	= 1.00

Highlighted

Depth (ft)	= 0.29
Q (cfs)	= 1.000
Area (sqft)	= 0.54
Velocity (ft/s)	= 1.84
Wetted Perim (ft)	= 2.83
Crit Depth, Yc (ft)	= 0.25
Top Width (ft)	= 2.74
EGL (ft)	= 0.34



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Culvert #1 - 40P

Invert Elev Dn (ft)	=	662.30
Pipe Length (ft)	=	85.00
Slope (%)	=	0.94
Invert Elev Up (ft)	=	663.10
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Corrugate Metal Pipe
Culvert Entrance	=	Headwall
Coeff. K,M,c,Y,k	=	0.0078, 2, 0.0379, 0.69, 0.5

Embankment

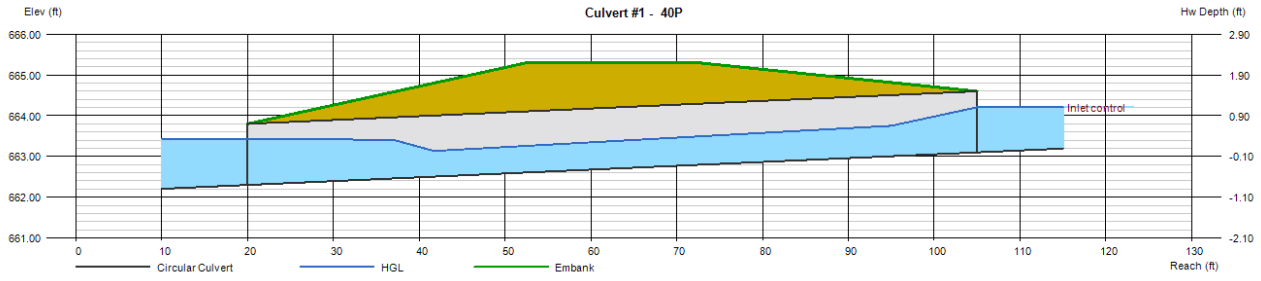
Top Elevation (ft)	=	665.30
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	4.04
Qmax (cfs)	=	4.04
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	4.04
Qpipe (cfs)	=	4.04
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.82
Veloc Up (ft/s)	=	4.43
HGL Dn (ft)	=	663.43
HGL Up (ft)	=	663.87
Hw Elev (ft)	=	664.21
Hw/D (ft)	=	0.74
Flow Regime	=	Inlet Control



Culvert Report

Culvert #2 - 20P

Invert Elev Dn (ft)	=	681.00
Pipe Length (ft)	=	35.00
Slope (%)	=	1.43
Invert Elev Up (ft)	=	681.50
Rise (in)	=	30.0
Shape	=	Circular
Span (in)	=	30.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

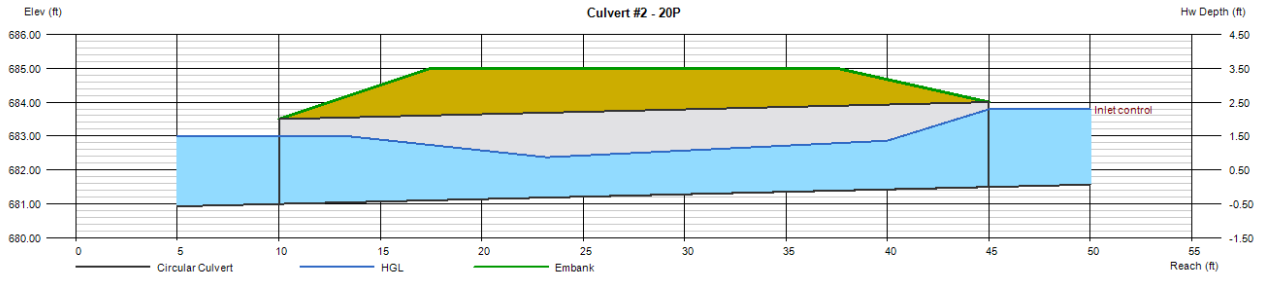
Top Elevation (ft)	=	685.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	14.00

Calculations

Qmin (cfs)	=	19.82
Qmax (cfs)	=	19.82
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	19.82
Qpipe (cfs)	=	19.82
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	4.70
Veloc Up (ft/s)	=	6.40
HGL Dn (ft)	=	683.00
HGL Up (ft)	=	683.01
Hw Elev (ft)	=	683.79
Hw/D (ft)	=	0.92
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Culvert #3 - 23P

Invert Elev Dn (ft)	=	704.50
Pipe Length (ft)	=	31.00
Slope (%)	=	4.84
Invert Elev Up (ft)	=	706.00
Rise (in)	=	15.0
Shape	=	Circular
Span (in)	=	15.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

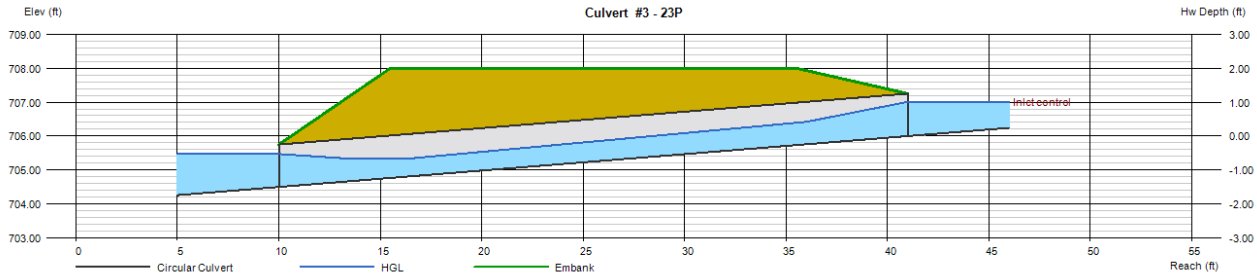
Top Elevation (ft)	=	708.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	3.00
Qmax (cfs)	=	3.00
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	3.00
Qpipe (cfs)	=	3.00
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.93
Veloc Up (ft/s)	=	4.27
HGL Dn (ft)	=	705.47
HGL Up (ft)	=	706.70
Hw Elev (ft)	=	707.01
Hw/D (ft)	=	0.81
Flow Regime	=	Inlet Control



Culvert Report

Hydraflow Express Extension for Autodesk® AutoCAD® Civil 3D® by Autodesk, Inc. Friday, Sep 6 2019

Culvert #4 - 25P

Invert Elev Dn (ft)	=	733.00
Pipe Length (ft)	=	25.00
Slope (%)	=	2.00
Invert Elev Up (ft)	=	733.50
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

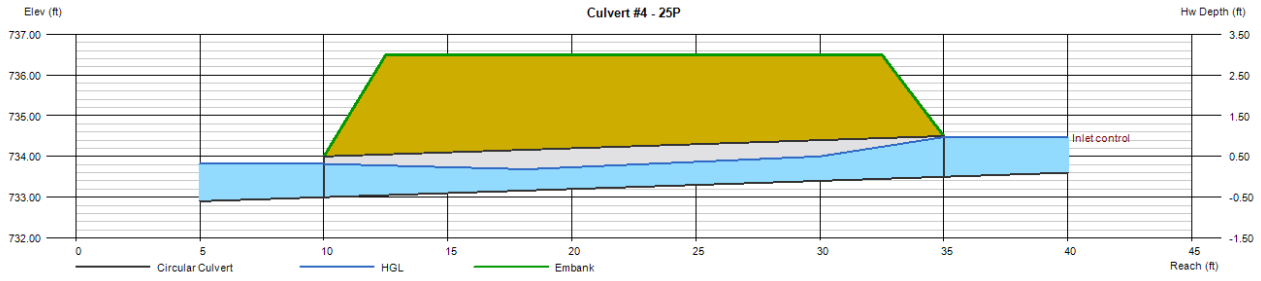
Top Elevation (ft)	=	736.50
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	2.20
Qmax (cfs)	=	2.20
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.20
Qpipe (cfs)	=	2.20
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.20
Veloc Up (ft/s)	=	4.19
HGL Dn (ft)	=	733.82
HGL Up (ft)	=	734.13
Hw Elev (ft)	=	734.47
Hw/D (ft)	=	0.97
Flow Regime	=	Inlet Control



Culvert Report

Culvert #5 - 31P

Invert Elev Dn (ft)	=	805.70
Pipe Length (ft)	=	25.00
Slope (%)	=	1.20
Invert Elev Up (ft)	=	806.00
Rise (in)	=	12.0
Shape	=	Circular
Span (in)	=	12.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Culvert
Culvert Entrance	=	Smooth tapered inlet throat
Coeff. K,M,c,Y,k	=	0.534, 0.555, 0.0196, 0.9, 0.2

Embankment

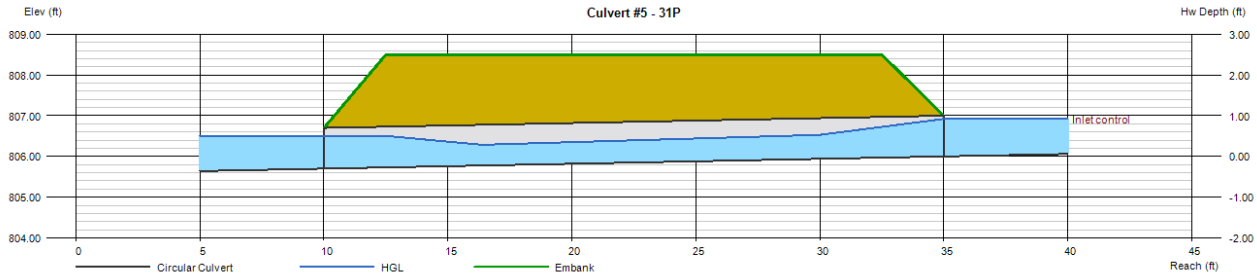
Top Elevation (ft)	=	808.50
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	2.10
Qmax (cfs)	=	2.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	2.10
Qpipe (cfs)	=	2.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	3.08
Veloc Up (ft/s)	=	4.12
HGL Dn (ft)	=	806.51
HGL Up (ft)	=	806.62
Hw Elev (ft)	=	806.92
Hw/D (ft)	=	0.92
Flow Regime	=	Inlet Control



Culvert Report

Culvert #6 - 24P

Invert Elev Dn (ft)	=	820.50
Pipe Length (ft)	=	57.00
Slope (%)	=	0.88
Invert Elev Up (ft)	=	821.00
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

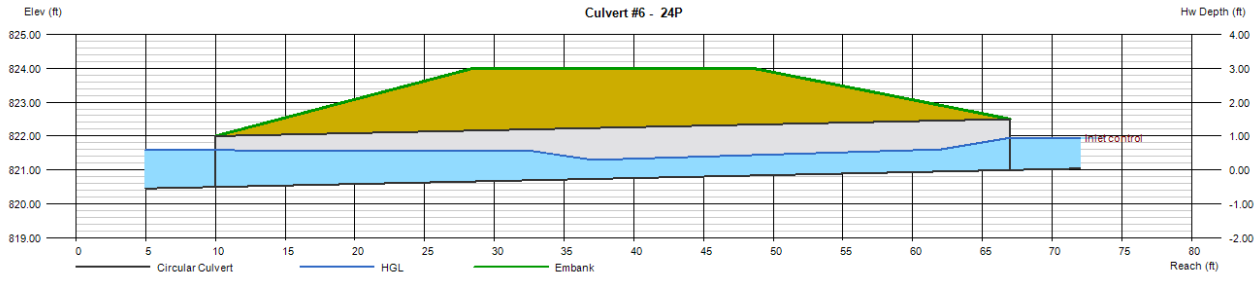
Top Elevation (ft)	=	824.00
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	3.10
Qmax (cfs)	=	3.10
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	3.10
Qpipe (cfs)	=	3.10
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	2.27
Veloc Up (ft/s)	=	4.06
HGL Dn (ft)	=	821.58
HGL Up (ft)	=	821.67
Hw Elev (ft)	=	821.95
Hw/D (ft)	=	0.63
Flow Regime	=	Inlet Control



Culvert Report

Culvert #7 - 22P

Invert Elev Dn (ft)	=	727.80
Pipe Length (ft)	=	35.00
Slope (%)	=	1.14
Invert Elev Up (ft)	=	728.20
Rise (in)	=	18.0
Shape	=	Circular
Span (in)	=	18.0
No. Barrels	=	1
n-Value	=	0.012
Culvert Type	=	Circular Concrete
Culvert Entrance	=	Square edge w/headwall (C)
Coeff. K,M,c,Y,k	=	0.0098, 2, 0.0398, 0.67, 0.5

Embankment

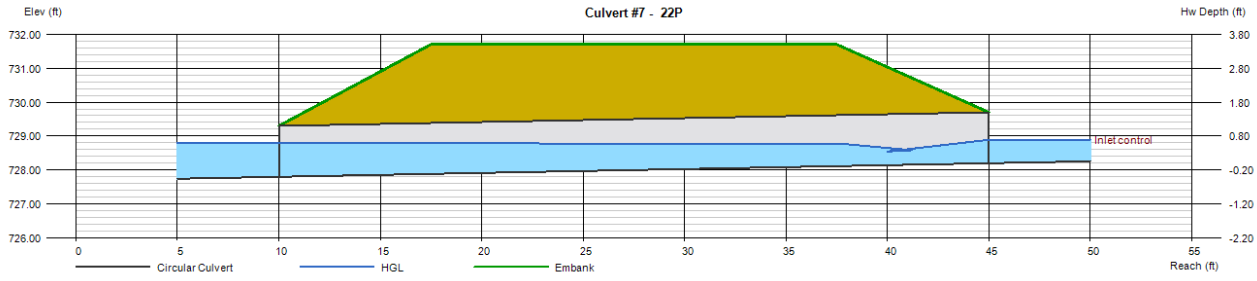
Top Elevation (ft)	=	731.70
Top Width (ft)	=	20.00
Crest Width (ft)	=	20.00

Calculations

Qmin (cfs)	=	1.80
Qmax (cfs)	=	1.80
Tailwater Elev (ft)	=	(dc+D)/2

Highlighted

Qtotal (cfs)	=	1.80
Qpipe (cfs)	=	1.80
Qovertop (cfs)	=	0.00
Veloc Dn (ft/s)	=	1.43
Veloc Up (ft/s)	=	3.41
HGL Dn (ft)	=	728.80
HGL Up (ft)	=	728.71
Hw Elev (ft)	=	728.89
Hw/D (ft)	=	0.46
Flow Regime	=	Inlet Control



APPENDIX C

Rip Rap Apron
Calculations

Borrego Solar Systems, Inc.
55 Technology Drive, Suite 102
Lowell, MA 01851

Project:	117 Bliss Road Schoharie NY		
Subject:	Rip Rap Apron Calculations		
Designed By:	DMA	Date:	8/28/2019
Checked By:	DMA	Date:	8/28/2019

Rational Method for calculating the size of the rip rap aprons.
Purpose:

To evaluate the size of the rip rap apron and stone size for each of the pipe outlets proposed for the project. The rational methodQ = CIA is used to determine the flow rate (in cubic feet per second) based on the Area (A), Coefficent (C) of the surface type, and the Intensity (I) for a specifc duration and storm frequency. The inputs and the calculations are entered into . Hydraflow to determine rate of runoff (cfs) and velocity, amongst other values

Inputs:

Using B type soils and a slope of > 6% on average the following C values are used.

Forest	0.18	
Meadow	0.37	
Pasture	0.45	
Farmland	0.28	
Gravel road	0.85	
Disturbed areas	0.7	
Brush	0.25	
Solar	0.37	same as meadow

Storm Event is 10 yr storm at 60 minutes duration = 1.55 inches/hour
This is based on Future Projections for a Changing Climate developed by Cornell University

40P Culvert 1 (subcatchment 40)

A (acres)	Description	C	I (inches/hr)	CIA	
0.05	Dirt	0.75	1.55	0.06	cfs
0.294	gravel road	0.85	1.55	0.39	cfs
2.028	Farmland	0.28	1.55	0.88	cfs
5.577	Farmland	0.28	1.55	2.42	cfs
0.27	Forest	0.18	1.55	0.08	cfs
0.8	Forest	0.18	1.55	0.22	cfs
9.019			total 40P	4.04	cfs

20P Culvert 2 (subcatchment 20)

A (acres)	Description	C	I (inches/hr)	CIA	
0.78	brush	0.25	1.55	0.30	cfs
5.137	brush	0.25	1.55	1.99	cfs
0.04	gravel road	0.85	1.55	0.05	cfs
0.616	gravel road	0.85	1.55	0.81	cfs
0.725	meadow	0.35	1.55	0.39	cfs
9.004	meadow	0.35	1.55	4.88	cfs
0.007	Paved Parking (pads)	0.95	1.55	0.01	cfs
4.974	Farmland	0.28	1.55	2.16	cfs
8.276	Farmland	0.28	1.55	3.59	cfs
1.046	Forest	0.18	1.55	0.29	cfs
8.268	Forest	0.18	1.55	2.31	cfs
38.873			subtotal 20P	16.79	cfs
			total 20P + 24P	19.82	cfs

23P Culvert 3 (subcatchment 23)

A (acres)	Description	C	I (inches/hr)	CIA	
0.128	gravel road	0.85	1.55	0.17	cfs
0.27	gravel road	0.85	1.55	0.36	cfs
2.912	meadow	0.37	1.55	1.67	cfs
1.274	meadow	0.37	1.55	0.73	cfs
0.01	paved parking (pads)	0.95	1.55	0.01	cfs
0.114	farmland	0.28	1.55	0.05	cfs
0.036	Farmland	0.28	1.55	0.02	cfs
4.744			total 23P	3.00	cfs

25P Culvert 4 (subcatchment 25)

A (acres)	Description	C	I (inches/hr)	CIA	
0.674	brush	0.25	1.55	0.26	cfs
0.72	brush	0.25	1.55	0.28	cfs
0.288	gravel road	0.85	1.55	0.38	cfs
0.09	gravel road	0.85	1.55	0.12	cfs
0.285	meadow	0.35	1.55	0.15	cfs
0.108	Farmland	0.28	1.55	0.05	cfs
0.016	Farmland	0.28	1.55	0.01	cfs
2.728	Forest	0.18	1.55	0.76	cfs
0.489	Forest	0.18	1.55	0.14	cfs
5.398			total 25P	2.14	cfs

31P Culvert 5 (subcatchment 31)

A (acres)	Description	C	I (inches/hr)	CIA	
0.085	gravel road	0.85	1.55	0.11	cfs
3.409	meadow	0.37	1.55	1.96	cfs
0.004	farmland	0.28	1.55	0.00	cfs
3.498			total 31P	2.07	cfs

24P Culvert 6 (subcatchment 24)

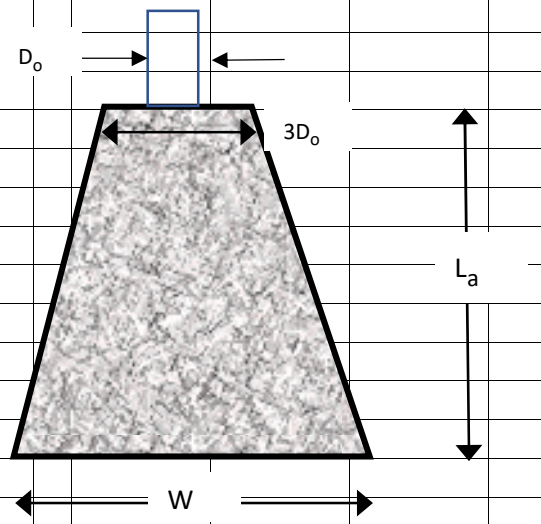
A (acres)	Description	C	I (inches/hr)	CIA	
0.001	gravel road	0.85	1.55	0.00	cfs
0.057	gravel road	0.85	1.55	0.08	cfs
0.018	meadow	0.37	1.55	0.01	cfs
5.082	meadow	0.37	1.55	2.91	cfs
0	paved parking (pads)	0.95	1.55	0.00	cfs
0.014	paved parking (pads)	0.95	1.55	0.02	cfs
5.172			total 24P	3.02	cfs

``

22P Culvert 7 (subcatchment 21)

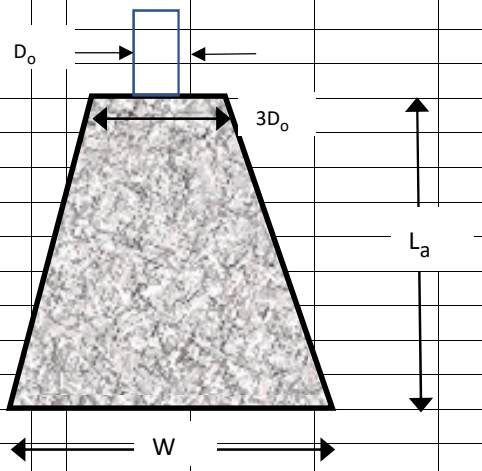
A (acres)	Description	C	I (inches/hr)	CIA	
1.27	brush	0.25	1.55	0.49	cfs
0	paved parking (pads)	0.95	1.55	0.00	cfs
0.26	gravel road	0.85	1.55	0.34	cfs
0.73	meadow	0.37	1.55	0.42	cfs
3.537	forest			0.00	cfs
1.162	farmland	0.28	1.55	0.50	cfs
6.959			total 24P	1.76	cfs

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
			55 Technology Drive, Suite 102			Subject:	Rip Rap Apron Calculations		
			Lowell, MA 01851			Designed By:	DMA	Date:	8/28/2019
						Checked By:	DMA	Date:	8/28/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #2			



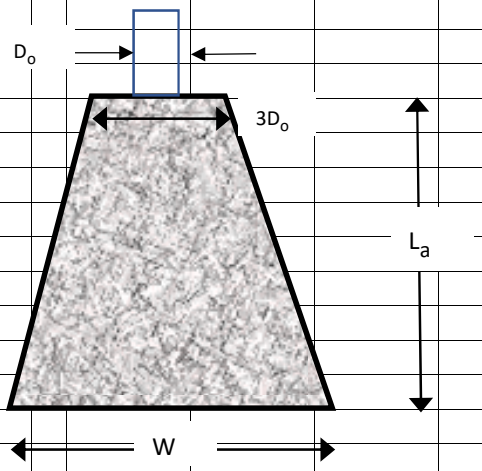
D_0	=	30	inches						
Tw	=	0							
Q	=	19.8	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	28.5	feet						
Say		29.0	feet						
W =		3Do + La							
W	=	36.5	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	15.8	inches						
Say		FALSE	inches						

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
			55 Technology Drive, Suite 102			Subject:	Rip Rap Apron Calculations		
			Lowell, MA 01851			Designed By:	DMA	Date:	8/28/2019
						Checked By:	DMA	Date:	8/28/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #3			



D_0	=	15	inches						
Tw	=	0							
Q	=	3.0	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	13.7	feet						
Say		14.0	feet						
W =		3Do + La							
W	=	17.8	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	3.2	inches						
Say		6.0	inches						

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
			55 Technology Drive, Suite 102			Subject:	Rip Rap Apron Calculations		
			Lowell, MA 01851			Designed By:	DMA	Date:	8/28/2019
						Checked By:	DMA	Date:	8/28/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #4			



D_0	=	12	inches						
Tw	=	0							
Q	=	2.1	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	11.6	feet						
Say		12.0	feet						
W =		3Do + La							
W	=	15.0	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	2.8	inches						
Say		6.0	inches						

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
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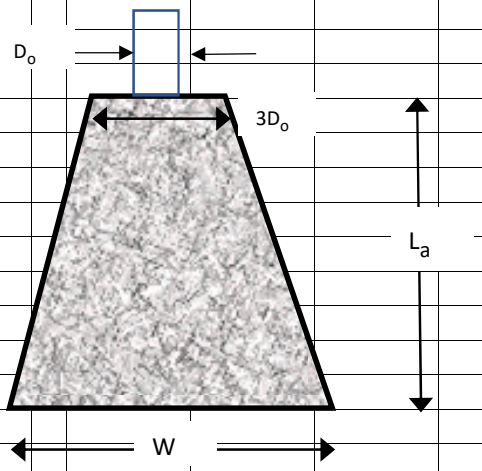
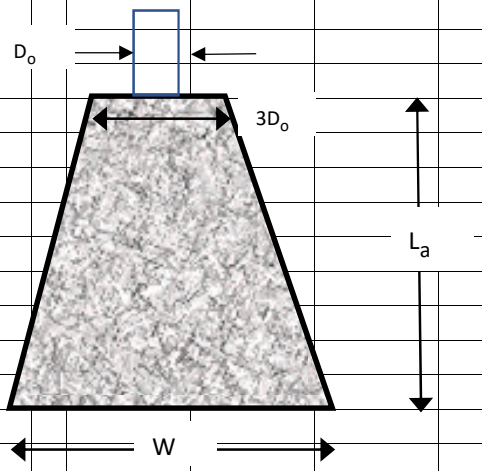
			Lowell, MA 01851			Designed By:	DMA	Date:	8/28/2019
						Checked By:	DMA	Date:	8/28/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #5			



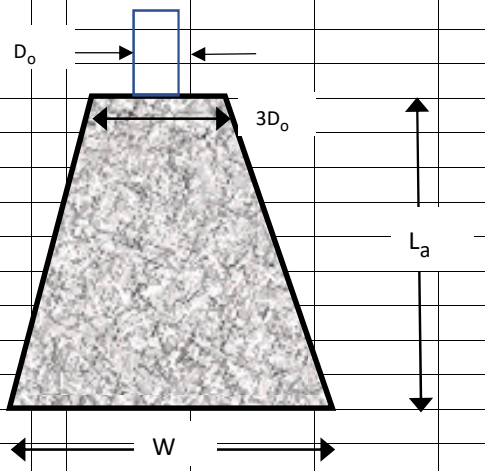
D_0	=	18	inches						
Tw	=	0							
Q	=	2.1	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	13.9	feet						
Say		14.0	feet						
W =		3Do + La							
W	=	18.5	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	1.5	inches						
Say		6.0	inches						

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
			55 Technology Drive, Suite 102			Subject:	Rip Rap Apron Calculations		
			Lowell, MA 01851			Designed By:	DMA	Date:	8/28/2019
						Checked By:	DMA	Date:	8/28/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #6			



D_0	=	12	inches						
Tw	=	0							
Q	=	3.0	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	13.1	feet						
Say		13.0	feet						
W =		3Do + La							
W	=	16.0	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	4.4	inches						
Say		6.0	inches						

			Borrego Solar Systems, Inc.			Project:	117 Bliss Road Schoharie NY		
			55 Technology Drive, Suite 102			Subject:	Rip Rap Apron Calculations		
			Lowell, MA 01851			Designed By:	DMA	Date:	9/6/2019
						Checked By:	DMA	Date:	9/6/2019
Borrego Solar									
Calculate Rip Rap Apron size for culvert outlets						Culvert #7			



D_0	=	12	inches						
Tw	=	0							
Q	=	1.8	cfs	(10-Year Storm)					
				From Rational Method Calculations					
L_a	=	$((1.7Q)/(D_o^{1.5})$							
L_a	=	11.0	feet						
Say		11.0	feet						
W =		3Do + La							
W	=	14.0	feet						
d_{50}	=	$((0.02/T_w)(Q/D_o))^{4/3}$		Assume T_w is 0.01'					
d_{50}	=	2.1	inches						
Say		6.0	inches						